Dec. 12, 1950 A. C. PIERCE 2,533,283

TRIGGER MECHANISM

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Fig -1-

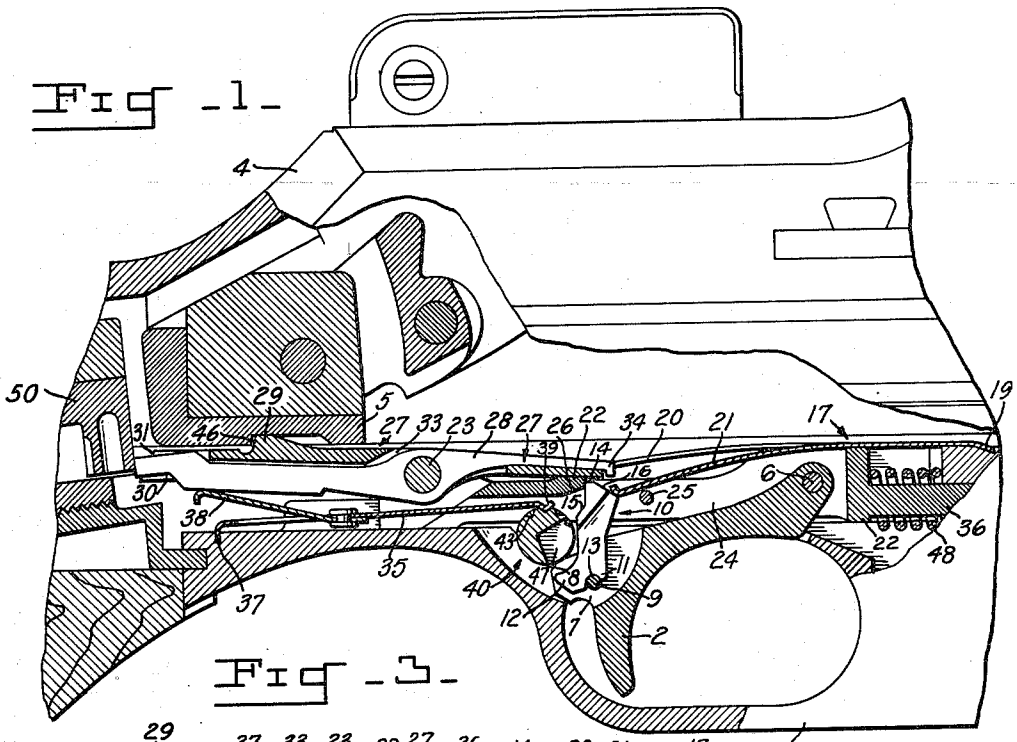



Fig -3-

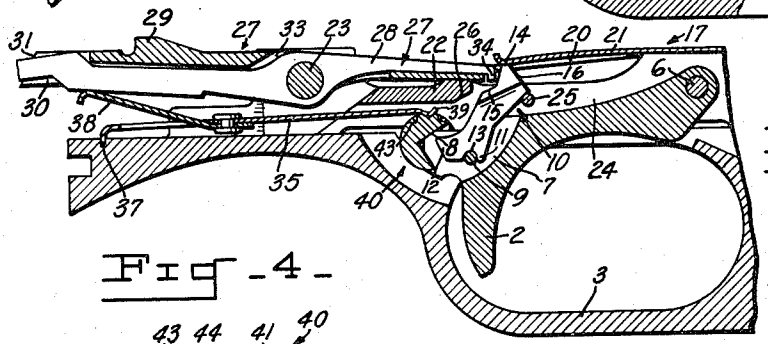



Fig -7-

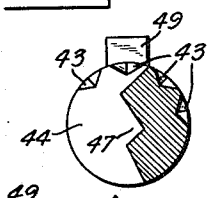



Fig -4-

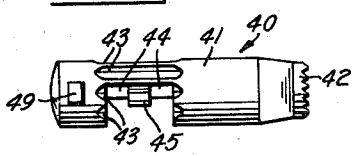



Fig -6-

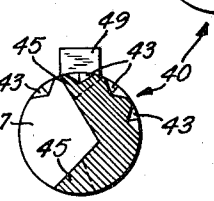
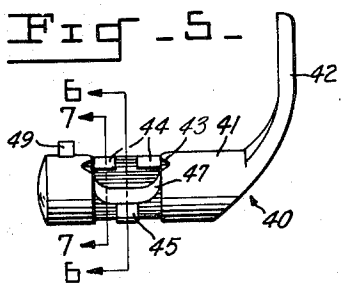



Fig -5-




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TRIGGER MECHANISM

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Fig. 2.

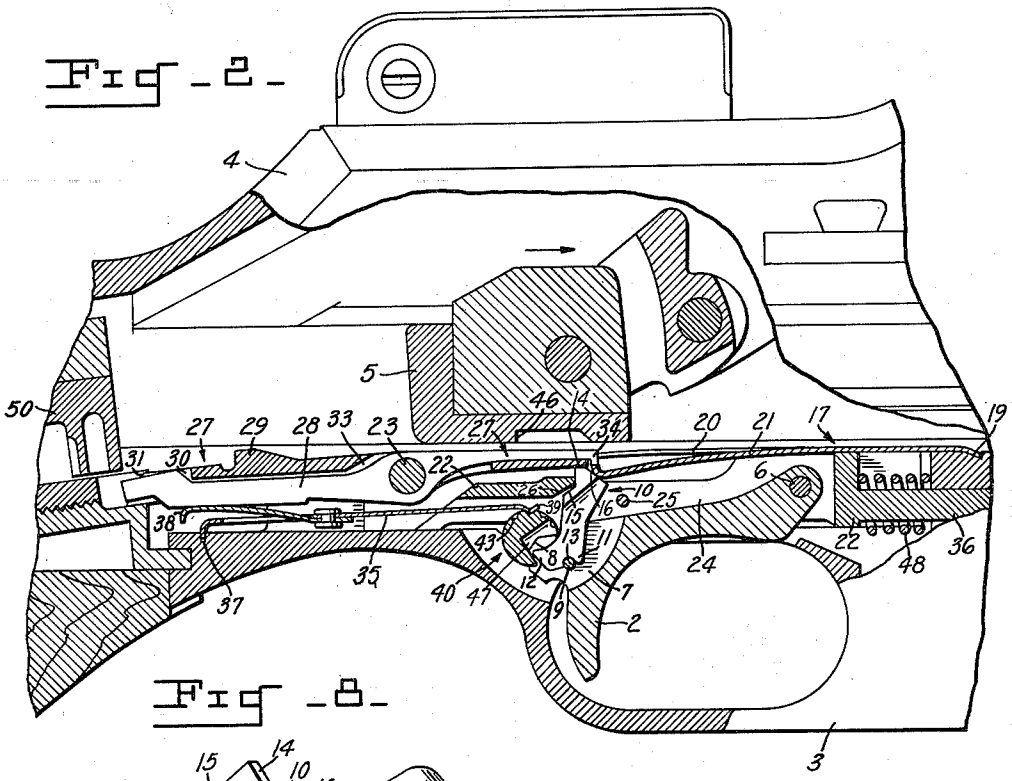



Fig. 8.

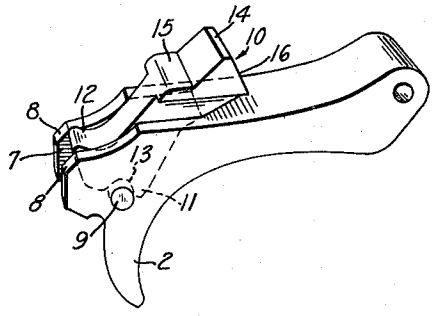



Fig. 9.
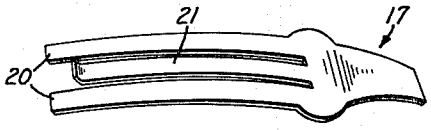



Fig. 10.

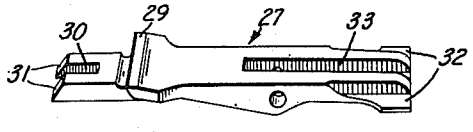
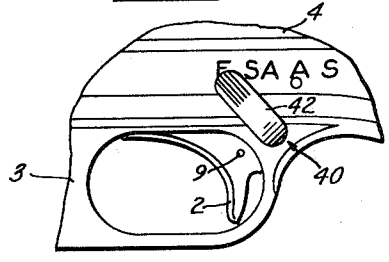



Fig. 11.




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# UNITED STATES PATENT OFFICE

2,533,283

## TRIGGER MECHANISM

Albert C. Pierce, United States Marine Corps

Application July 26, 1946, Serial No. 686,277

1 Claim. (Cl. 89—142)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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

This invention relates to an automatic firearm and more particularly to a trigger mechanism whereby an automatic firearm may be fired at two different rates of automatic fire and semi-automatically as well.

In the Browning automatic rifle as described in Browning Patent No. 1,293,022, a rate reducing mechanism therefor has been evolved to produce a slow rate of automatic fire in addition to the normal high rate of fire. Such rate reducing mechanism is fully explained in U. S. Patent No. 2,379,461 to Clarence E. Simpson. The safety feature of the basic firearm has, of course, been unchanged and functions in the usual manner. However, this rate reducing mechanism has eliminated the previous feature of semi-automatic fire.

It has been found that in certain tactical situations single shot fire is highly desirable. For instance, the operator of the firearm may wish to hide from the enemy the fact that an automatic weapon is present and when attacked can combine the element of surprise and the fire power of the weapon to beat off such attack.

Without this invention a dextrous operator may be able to fire single shots with the selector set at the slow rate of fire, but such operation requires expert manipulation of the trigger finger, an art which usually presents considerable difficulty to an inexperienced operator.

It is therefore the purpose of this invention to change the existing rate reducing mechanism in a Browning automatic rifle so as to incorporate semi-automatic, or single shot fire in addition to the other two rates of automatic fire.

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 fragmentary elevational view of the operating section of a gun in partial longitudinal section showing the semi-automatic position of the trigger mechanism prior to pulling the trigger.

Fig. 2 is a view similar to Fig. 1 but showing the trigger mechanism after the trigger has been pulled sufficiently to release a slide.

Fig. 3 is a fragmentary elevational view of the trigger mechanism in longitudinal section showing the position of the assembly after the trigger has been pulled fully to the rear.

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Fig. 4 is a top elevational view of the change lever.

Fig. 5 is a side view of the change lever shown in Fig. 4.

Fig. 6 is an enlarged view taken along line 6—6 of Fig. 5.

Fig. 7 is an enlarged view taken along line 7—7 in Fig. 5.

Fig. 8 is a perspective view of the trigger and connector assembled thereto.

Fig. 9 is a perspective view of the sear spring.

Fig. 10 is a perspective view of the sear.

Fig. 11 is a fragmentary elevational view of a portion of the gun in the region of the trigger housing showing the markings on the receiver for the various settings for the trigger mechanism.

The operation of the Browning automatic rifle and the added features of the rate reducing mechanism are contained in the patents to Browning and Simpson respectively mentioned above. For the purposes of this invention reference will be made only to those parts and functions as are here concerned.

The operation of the firearm with which this invention is concerned depends on a movable slide. If such slide is free to reciprocate, a rapid rate of automatic fire is produced. But if the slide is momentarily halted in its reciprocating travel by a sear, a slow rate of automatic fire is obtained. In order to secure semi-automatic or single-shot fire, the slide obviously must be retained by the sear until such time as the trigger is again pulled. The method by which such action of the sear and slide can be obtained will be explained below.

A trigger 2 is pivoted at its forward end between the walls of a trigger guard 3 by a pin 6. The rear top end of trigger 2 is slotted longitudinally as shown at 7 in Fig. 8, and the metal on each side of slot 7 forms two shoulders 8 for a purpose to be explained. Transversely disposed within slot 7 is a pin 9 which serves to seat a connector 10.

Such connector fits loosely within trigger slot 7 and is shaped in the form of a boot with a heel 11 and a toe 12. The portion of connector 10 which may be termed the instep 13 pivotally engages pin 9. The upper portion of connector 10 extends above trigger shoulders 8 and has a narrow flat head 14 and a cam surface 15 on the back side of connector 10 sloping downwardly and rearwardly for a purpose to be explained. Another inclined surface 16 slopes downwardly and forwardly from head 14. A sear spring 17 (Fig. 9) of the flat type is mounted in longitudinal grooves (not shown) in the sides of trigger guard

3 and is secured in position by the forward end thereof engaging a transverse slot 19 in trigger guard 3. The rear portion of sear spring 17 consists of three tongue-like leaves, two similar outer leaves 20 and a short middle leaf 21.

A sear carrier 22, having a vertical longitudinal slot 24 provided therein and opposed transverse longitudinal slots (not shown) in the forward end of the side walls thereof, is slidably mounted within trigger guard 3 for limited longitudinal movement on trigger pin 6. A transverse pin 23 is mounted towards the rear of slot 24 with the ends protruding equidistant from both sides of sear carrier 22 which are slidably mounted in opposed transverse longitudinal slots (not shown) in the walls of trigger guard 3. A forward portion 36 of sear carrier 22 is diametrically shaped to accommodate a helical spring 48. The front end of spring 48 is seated against the forward inside wall of trigger guard 3 and provides bias to carrier 22 to absorb the blow on counter-recoil in a manner described in the first mentioned patent referred to above. The upper portion of trigger 2 and the connector 10 both lie within the longitudinal slot 24 in sear carrier 22. Transversely disposed within slot 24 is a fixed pin 25 which lies in front of connector 10 and limits the forward movement thereof. On the underside of sear carrier 22 at the rear end of slot 24 is an upwardly inclined surface 26, which mates with and cams connector 10 in a manner to be explained.

Pin 23 is also used to pivotally mount a sear 27 and a sear release stop lever 28. As shown in Fig. 10, sear 27 has a rearwardly extending nose 29 and a bifurcated rear end 30 having upwardly inclined cam surfaces 31. The forward end of sear 27 terminates in two outwardly extending flat ears 32. Sear release stop lever 28 lies within a slot 33 in sear 27 and the forward end of lever 28 terminates in a downwardly projecting tip 34. The rear portion of lever 28 extends upwardly from beneath sear 27 into the bifurcated rear end 30 and protrudes rearwardly beyond cam surfaces 31.

A spring 35 of the flat type is mounted in longitudinal grooves (not shown) at the rear of trigger guard 3 and is retained in position by the rear end engaging a transverse groove 37 in trigger guard 3 in a manner similar to that of sear spring 17. A rearwardly and upwardly extending tongue 38 on spring 35 abuts the underside of the rear portion of lever 28. A forwardly extending portion of spring 35 terminates in a curved toe 39 which cooperates with a change lever 40 to obtain the different positions for the classes of operation of the rifle.

Change lever 40 consists of a cylindrical bar 41 transversely mounted in trigger guard 3 from the left side thereof as shown in Fig. 11. A projecting lug 49 on bar 41 limits the lateral displacement of change lever 40 when inserted in trigger guard 3 and is retained in position between the inner surface of the further wall thereof and a clearance cut (not shown) on the outer right side wall of sear carrier 22. One end of bar 41 terminates in a perpendicularly disposed arm 42 which serves as a handle for effecting rotation of change lever 40. Four shallow longitudinal grooves 43 are cut on the periphery of bar 41, so disposed as to be on top thereof when arm 42 is held in a vertical position with the arm pointing upwards. The forward side of bar 41 is slotted vertically as shown at 44 in Figs. 4 and 5 in such a way as to leave a little tongue of metal. Such tongue is then bisected by a longitudinal groove 47 so as to leave a projecting lug 45 at the top and bottom between vertical slots 44. The arm 42 of change lever 40 extends upward when assembled to the trigger guard 3 along the left side of receiver 4 on which is marked the positions "F" for slow rate of automatic fire, "SA" for semi-automatic fire, "A" for rapid rate of automatic fire, and "S" for safety in clockwise order as shown in Fig. 11. The cuts and lugs on change lever bar 41 control the action of the trigger 2 and connector 10 giving the classes of fire mentioned above.

At the start of the cycle for semi-automatic fire, a reciprocable slide 5 is held to the rear by the engagement of sear nose 29 with a sear notch 46 in the underside of slide 5. Change lever 40 has been rotated to the position for semi-automatic fire indicated by "SA" on the left side of receiver 4. The toe 39 of change lever spring 35 at this time engages the uppermost longitudinal groove 43 in change lever 40 to prevent the possible rotation thereof against the jar of the recoiling parts into an adjacent groove which would effect a different class of fire. When trigger 2 is pulled rearwardly, such trigger pivots upwardly about trigger pin 6 thereby raising connector 10 against the bias of the middle leaf 21 of sear spring 17. The flat head 14 of connector 10 therefore contacts the underside of the forward edge of sear 27. Thus connector 10 serves as an auxiliary means whereby the movement of trigger 2 effects the release of slide 5 through the medium of sear 27.

Continued pressure on trigger 2 raises connector 10 higher, causing sear 27 to pivot about sear carrier pin 23 against the bias of sear spring outer leaves 20 which press down on ears 32 of sear 27. At this time shoulders 8 on trigger 2 enter slots 44 substantially as shown in Fig. 2. As the front end of sear 27 pivots upwardly, sear nose 29 drops from engagement with sear notch 46 allowing slide 5 to go forward under the action of recoil spring (not shown) to fire a cartridge in the manner typical of the Browning automatic rifle.

Further pressure on trigger 2 causes connector head 14 to rise even higher to a point where connector 10 begins to be cammed forward by the sear carrier cam surface 26. At this point trigger shoulder 8 bottoms in longitudinal groove 47 across change lever slots 44 thereby preventing any further upward travel of connector 10. As connector 10 is cammed forwardly, head 14 slips out from under the front end of sear 27 past projecting tip 34 of sear release stop lever 28, and the connector front cam surface 16 raises sear spring middle leaf 21. Since sear releases stop lever 28 is not here contacted by connector 10, such lever 28 remains in the unpivoted position with the rear portion thereof protruding beyond cam surfaces 31 on the rear end of sear 27. Thus when sear 27 returns to the unpivoted position under pressure of the outer leaves 20 of sear spring 17, a sear release 50 cannot strike cam surfaces 31 to pivot sear again to release slide 5 as in slow automatic fire. The upraised tongue 38 of change lever spring 35 keeps sear release stop lever 28 from pivoting in semi-automatic fire due to the jar given the gun by the recoiling parts thereof. With sear 27 in the normal position, as shown in Fig. 3, sear nose 29 is obviously once again in a position to engage sear notch 46 in slide 5, thereby assuring that but one shot is fired. As trigger 2 is released prior

to firing the next shot the downward bias of sear spring middle leaf 21 urges the return of connector 18 to the pre-firing position shown in Fig. 1.

It should be understood that the parts of this invention also provide for slow and fast automatic fire as well as a safety position which are described in the Simpson patent referred to herein. However this invention provides the additional feature of semi-automatic fire as explained above.

Thus there is here provided a means for obtaining semi-automatic fire in a Browning automatic rifle merely by selecting the proper position for a selector lever.

I claim:

In an automatic firearm having a trigger slotted to form a pair of bifurcated shoulders, a slide reciprocable between a recoiled and a battery position, a pivotal sear arranged to engage and retain the slide in the recoiled position, reciprocable sear release means operative on the rear end of the sear for pivoting the latter to disengage from the slide, a stop lever jointly pivoted with the sear and normally positioned to block the sear-actuating movement of the sear release means and resilient means for returning the sear and the stop lever to their original unpivoted position, the combination of, an auxiliary member pivotally carried by the trigger and operative on the front end of the sear for pivoting the latter to disengage from the slide, a rotatable member transversely mounted in the firearm and having an outwardly projecting handle portion, said member having four longitudinal spaced grooves about the periphery thereof and a cutaway portion intersecting two of said four grooves, said cutaway portion being formed by a



pair of slots substantially parallel to the vertical axis of said handle portion and a groove medially connecting said slots and of increased depth relative thereto, and means for selectively positioning said rotatable member with any one of said four longitudinal grooves in the uppermost position whereby three different classes of fire and a safe position are individually obtained upon actuation of the trigger, said cutaway portion being inclined relative to the vertical so as to permit the trigger shoulders to bottom therein when said rotatable member is located with said third peripheral groove in the uppermost position, said auxiliary member being constructed and arranged so as to pivot sufficiently forward upon actuation by the trigger to bypass the front end of the stop lever whereupon the rear end of the lever will be in position to block the sear-disengaging movement of the sear release means and thereby produce semi-automatic fire in that another cycle of trigger actuation is required to again release the sear from the recoiled position.

ALBERT C. PIERCE.


## REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,144,994 | Berthier | July 6, 1915 |
| 1,293,022 | Browning | Feb. 4, 1919 |
| 2,379,461 | Simpson | July 3, 1945 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 588,476 | Germany | Nov. 18, 1933 |