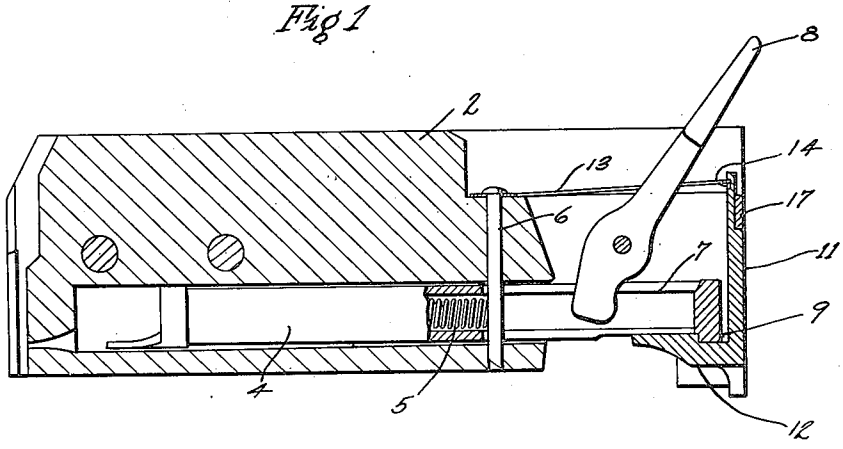
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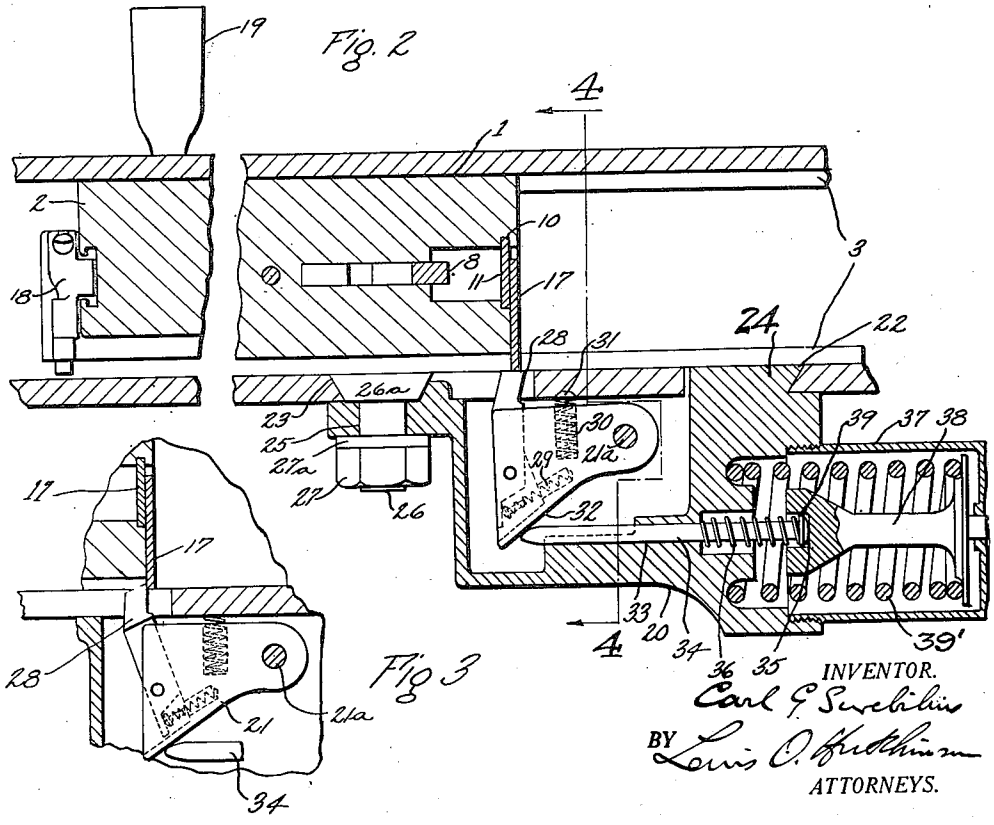
C. G. SWEBILIUS

AUTOMATIC GUN

Original Filed June 11, 1918 2 sheets-sheet 1

Fig 1





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Fig. 5

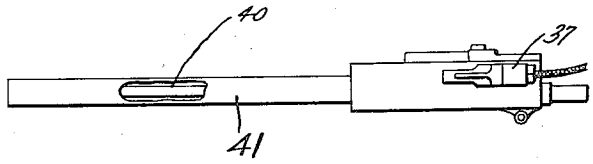
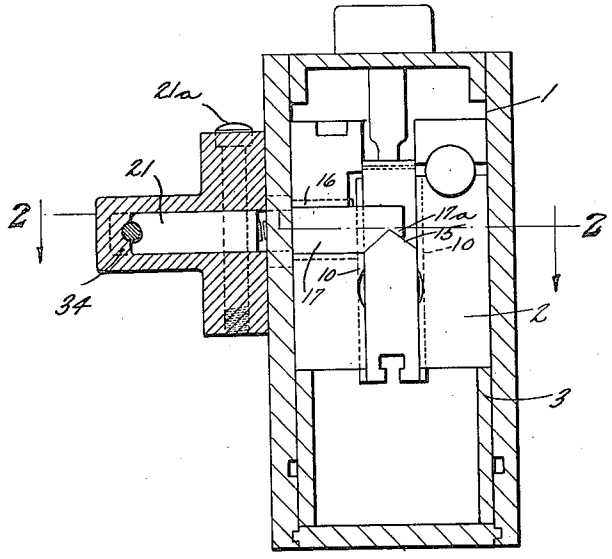


Fig. 4



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Patented Apr. 3, 1923. 1,450,653

UNITED STATES PATENT OFFICE.

CARL G. SWEBILIUS, OF NEW HAVEN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE MARLIN FIREARMS CORPORATION, OF NEW HAVEN, CONNECTICUT, A CORPORATION OF DELAWARE.

AUTOMATIC GUN.

Application filed June 11, 1918, Serial No. 239,360. Renewed November 21, 1921. Serial No. 516,901.

To all whom it may concern:

Be it known that I, CARL G. SWEBILIUS, a citizen of the United States, residing at New Haven, county of New Haven, State of Connecticut, have invented a certain new and useful Improvement in Automatic Guns, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

This invention relates to automatic firearms and pertains especially to the firing control mechanism thereof.

It is the object of this invention to utilize impulses of a higher frequency than the firing frequency of an automatic gun to effect the firing of the gun at definite times.

This object is obtained by providing a trigger adapted for continuous operation by impulses transmitted thereto and providing means on the trigger to render it inoperative to effect the firing of the gun except on the operation of the trigger next succeeding the complete breaching of the gun.

This arrangement is of great utility in connection with automatic guns mounted on an aeroplane to shoot between the propeller blades. When automatic guns are mounted upon an aeroplane in this manner, it is essential that none of the bullets from the gun strike the blades of the propeller. Because of the fact that the propeller shaft seldom rotates at a rate of speed which is an exact multiple of the rate of fire of the gun, it is impractical to operate the gun except in connection with means for releasing the firing mechanism only at such times as the propeller blades are out of range.

The short interval of time between the passing out of range of one blade and the arrival of the succeeding blade makes it necessary that the firing mechanism be released immediately after the blade has passed out of range. This necessity is further increased by the ever-present possibility of a hang fire or the failure of the cartridge to explode immediately upon being struck by the firing pin. Unless the firing mechanism is released at the instant the blade passes out of range, there is always present the possibility that the bullet will strike the succeeding blade. Furthermore, it is highly desirable that the dispersion of the bullets be as slight as possible. By that is meant that the firing mechanism should always be released at the same interval of time after the propeller blade has moved out of range. Unless the dispersion is very small, it is impractical to so arrange the timing mechanism that the gun is fired immediately the blade passes out of range, for with a large dispersion the possibility is always present that the blade may not be out of range at the time of firing.

In order to control or time the firing of the gun after the propeller blade has passed out of range, means are provided whereby the rotation of the shaft generates hydraulic mechanical or electrical impulses or the like which are utilized to operate the firing mechanism of the gun. The generation of these impulses is so timed as to release the firing mechanism during the interval between the passage of one blade and the advent of the next.

To attain the aforementioned results this invention provides attaching to the gun a housing in which is pivotally mounted a trigger normally maintained in its inoperative position by a spring. Extending through one wall of the housing and adapted to contact with the trigger is a piston which may be operated by impulses transmitted thereto from the propeller shaft by any type of synchronizer system. The trigger is so arranged with respect to the piston that one of its surfaces is oblique to the path of the piston whereby contact of the piston with the trigger causes a slight rotation of the trigger. When the piston returns, the trigger is pressed back by the spring above mentioned. The trigger is provided with a lug adapted, when the trigger is operated, to extend into the receiver of the gun sufficiently to operate the firing pin release, or its operating means, thus firing the gun. The above-mentioned lug is pivoted to the trigger and normally held against a stop or abutment by a spring.

The arrangement of the lug on the trigger is such that if, at any instant during the reloading of the gun prior to the complete breeching thereof, the trigger is so operated that the lug contacts with the firing pin release mechanism, the former will yield against the action of its spring and allow

the breeching of the gun without the operation of the release mechanism. The lug will retain such position until after the trigger returns to inoperative position, at which time the lug will again resume its normal position.

This arrangement of firing mechanism positively assures the firing of the gun at the impulse next succeeding the complete breeching of the gun, and positively prevents the firing of the gun at the instant of breeching, should an impulse at that instant operate the trigger. The firing pin is therefore always released the same period of time after the propeller blade has passed out of range, that interval being controlled by the particular synchronizer system used to transmit impulses from the propeller shaft to the piston, thereby reducing the dispersion to a minimum.

Other objects of this invention will become apparent from the specification.

In the drawings I have disclosed my invention as applied to that type of automatic guns, now commonly known as the heavy Browning. It will, of course, be readily understood that my invention is not limited in its use to this particular gun but can be used in connection with various other automatic guns of the same general construction.

Referring to the accompanying drawings:

Fig. 1 is a side elevation of the breech block.

Fig. 2 is a longitudinal horizontal section through the receiver and breech bolt on the line 2—2 of Fig. 4.

Fig. 3 is a detail of the trigger.

Fig. 4 is a section on the line 4—4 of Fig. 2.

Fig. 5 is an elevation of the gun with the synchronizer carrier attached.

In the drawings, the reference character 1 designates the receiver of a gun while 2 is a sliding breech block which reciprocates therein, on the guides 3. A hollow firing pin 4 is located at the bottom of the breech block. Contained within the firing pin and seated against the forward end thereof is a spring 5 the rear end of which abuts against a pin 6 which extends through a longitudinal slot 7 in the firing pin. Pivoted in the rear end of the breech block is a cocking lever 8 one end of which extends into the slot 7 of the firing pin, the other end extending above the breech block.

The rear end of the firing pin is provided with a shoulder 9 on its under surface. Slidably mounted in the guide ways 10 on the rear surface of the breech block is a sear 11 which is provided with a forwardly extending lug 12 which is adapted to engage with the shoulder 9 to hold the firing pin in its rear position against the tension of the spring 5. A spring 13, held in place by the pin 6, projects into a slot 14 in the sear 11 and tends to hold the latter in the position shown in Fig. 2. The upper end of the sear is tapered or pointed as shown at 15. Located at right angles to the sear and sliding in guide ways 16 is a sear slide 17 the under side of the inner end of which is cut out at 17ª to fit over the point 15 of the sear.

The breech block is provided with a cartridge extractor 18 and an operating handle 19.

Attached to one side of the gun is a housing or carrier 20 which contains a trigger 21. Cut in the side of the receiver of the gun are two slots 22 and 23 the outer end of each being under cut. At one end of the housing 20 is a lug 24 fitting in the slot 22, the outer end of the lug being oblique to fit the under cut on the slot. At the other end of the housing is a hole 25 in which is located the bolt 26. The head 26ª of this bolt is rectangular in shape and the ends thereof are cut on a slant to fit in the under cuts of the slot 23. A nut 27 and lock washer 27ª are provided for the bolt 26.

Pivotally mounted in the housing on the pin 21ª is the trigger 21. In the end of the trigger opposite the pin 21ª is a pivotally mounted dog 28 against which bears the spring 29 to hold the dog in the position shown in Fig. 2. A spring 30 is set in the trigger with its free end seated in a socket 31 in the side of the receiver. A surface 32 of the trigger is oblique and is adapted to act as a cam.

To operate the trigger use may be made of any desired form of synchronizing system. There is shown here a trigger motor 37 of such a system which comprises a cylindrical housing screwed on to the carrier 20. Slidably mounted therein and extending into the carrier to contact with the trigger is a trigger motor piston consisting of the two parts 34 and 38. The part 34 is provided with an enlarged end or head 35 and is surrounded by a coil spring 36. The inner end of the part 38 is provided with a socket 39 in which the head 35 seats. Surrounding the part 38 and interposed between a flange carried thereon and the carrier is a spring 39′.

The barrel of the gun is designated by the reference character 40 while 41 is the usual jacket through which a cooling fluid is circulated.

The operation of this device is as follows:

Referring to Fig. 4, the breech block is shown in the position taken by it when the gun is ready to be fired. The piston 38 is pushed in by an impulse transmitted thereto from the propeller shaft, or the like, by any suitable means, either mechanical or hydraulic. The movement of the piston causes the inner end of the plunger 34 to strike

against the cam surface 32 and rotate the trigger in such a way that the dog 28 pushes the sear slide 17. The movement of the sear slide causes the sear to move downwardly to disengage the lug 12 from the shoulder 9 of the firing pin. This disengagement allows the firing pin to be forced forward under the influence of the spring 4 thereby exploding the cartridge. The breech block is then moved rearwardly in the well known manner by the gas pressure within the barrel through the medium of a suitable action mechanism. By means of a suitable device in the top of the receiver the cocking lever is thrown from the position shown in Fig. 2 to its other position, thus causing the withdrawal of the firing pin from its forward position. This is accomplished by the interaction of the lower end of the cocking lever and the end of the slot 7. In the meantime the piston and plunger are being rapidly reciprocated by any suitable synchronizer system and as a result of such reciprocation, the trigger is being rapidly oscillated. The sear is raised by the spring 13 thus returning the sear slide 17 to position. The lug 12 engages with the shoulder 9 and the firing pin is again in firing position. If the trigger is in the position shown in Fig. 2 when the block returns to locked position, the dog will contact with the end of the sear slide and the next oscillation of the trigger will fire the gun. It often happens however that the trigger is forced in just before the breech block reaches firing position. This is due to the fact that the trigger oscillates at a different frequency than the normal rate of firing of the gun. In case of such a happening the end of the dog engages with the face of the sear slide and assumes the position shown in Fig. 3. When the trigger is released and returns to the position shown in Fig. 2 the dog disengages from the sear slide and drops into the position shown in Fig. 2. Then on the next reciprocation of the plunger the trigger is oscillated and since the dog is now in the position shown in Fig. 2, the sear slide will be forced in and the sear disengaged from the firing pin. The cycle of operations is then repeated.

From the above description, it is apparent that after the gun has been fired the oscillation of the trigger has no effect until the oscillation next succeeding the complete breeching of the gun. The gun will therefore operate at approximately regular intervals and will always be discharged at the same interval of time after the propeller blade has passed out of range thereby reducing the dispersion of the bullets to a minimum.

Although this invention has been disclosed in detail as adapted for airplane work, it is adapted for any use wherein it is desirable to operate the gun at a slower rate of fire than the normal rate of fire of the gun, and is more especially adapted for distant control of the firing of the gun.

It is, of course, understood that various modifications may be made in the structural features of this device without in any way departing from the invention defined in the appended claims.

I claim as my invention:

1. In an automatic gun, a breech block, a sear slidably mounted on said breech block, a slide mounted on said breech block for reciprocation relative to said sear, interengaging cam surfaces on said sear and slide, and a trigger adapted to engage said slide.

2. In an automatic gun, a breech block, a sear slidably mounted on said breech block, a slide mounted on said breech block for reciprocation relative to said sear, one of said reciprocatory members having a tapered head and the other having a tapered socket, and a trigger adapted to engage said slide.

3. In an automatic gun, a breech block, a sear slidably mounted on said breech block, a slide mounted on said breech block for reciprocation relative to said sear, means to operate said sear upon reciprocation of said slide, and means to operate said slide.

4. In an automatic gun, a breech block, a vertically-sliding sear mounted on said breech block, a slide mounted on said breech block for horizontal reciprocation, means to operate said sear upon reciprocation of said slide, and means to operate said slide.

5. In an automatic gun, a reciprocating breech block, a reciprocating sear carried by said breech block, a trigger, and means on said breech block intermediate said trigger and sear to move the sear when the trigger is operated.

6. In an automatic gun, a breech block, a sear and a slide mounted on said breech block for relative reciprocation and a cam surface on one of reciprocating members engaging a coacting cam surface on the other.

7. In an automatic gun, a breech block, a sear and a slide mounted on said breech block for relative reciprocation, one of the aforesaid members having a convex surface engaging with a concave surface in the other of the aforesaid members.

8. In an automatic gun, a breech block, a sear and a slide mounted on said breech block for relative reciprocation, and means to reciprocate the sear upon reciprocation of the said slide.

9. In an automatic gun, a breech block, a sliding sear and a reciprocating sear operating member both mounted upon said breech block, and interengaging oblique surfaces upon said elements.

10. In an automatic gun, a reciprocating breech block, a coacting sear and sear slide carried thereby, a pivotally mounted trigger, and a spring pressed dog carried thereby,

said dog being adapted to engage said sear slide.

11. In an automatic gun, an oscillatory trigger, a reciprocating breech block, a sear slidably mounted on said breech block, a slide on said breech block for operating said sear, and means to allow continuous oscillation of the trigger without operating the slide until after the gun is completely breeched.

12. In an automatic gun, a reciprocating breech bolt, a firing pin operatively associated therewith, a sear reciprocatively mounted on said breech bolt and adapted to hold said firing pin in inoperative position, and a slide mounted on said breech bolt and coacting with said sear whereby movement of the former causes the latter to release said firing pin and means to operate said slide.

13. In an automatic gun, a reciprocating breech bolt, a firing pin operatively associated therewith, a sliding sear mounted on said breech bolt and adapted to hold said firing pin in inoperative position, a sear slide mounted on said breech bolt, coacting oblique surfaces on said sear slide and sear whereby movement of the former causes the latter to release said firing pin and means to operate said sear slide.

14. In an automatic gun, a reciprocating breech bolt, a firing pin operatively associated therewith, a sear mounted on said breech bolt and adapted to hold said firing pin in inoperative position, a sear slide mounted on said breech bolt, one of said two last named members having a convex surface adapted for engagement with a concave surface in the other member whereby movement of the sear slide causes the sear to release said firing pin, and means to operate said sear slide.

15. In an automatic gun, a reciprocating breech bolt, a firing pin operatively associated therewith, a sear reciprocatively mounted on said breech bolt and adapted to hold said firing pin in inoperative position, a slide mounted on said breech bolt and coacting with said sear whereby movement of the former causes the latter to release said firing pin, and a trigger to operate said slide.

16. In an automatic gun, a reciprocating breech bolt, a firing pin operatively associated therewith, a sear adapted to hold said firing pin in inoperative position, a sear slide coacting with said sear whereby movement of the former causes the latter to release said firing pin, a trigger, and means on said trigger to engage said sear slide, said means being adapted to yield in a direction at right angles to the path of the trigger.

17. In an automatic gun, a reciprocating breech bolt, a firing pin operatively associated therewith, a sear adapted to hold said firing pin in inoperative position, a sear slide, said sear and sear slide being mounted on said breech bolt in coacting relation whereby movement of the latter causes the former to release said firing pin, a pivotally mounted trigger, said trigger having a pivoted lug adapted to engage said sear slide, and means to allow limited movement of said lug in a direction at right angles to the path of the trigger.

18. In an automatic gun, a reciprocating breech bolt, a firing pin operatively associated therewith, a sear adapted to hold said firing pin in inoperative position, a sear slide, said sear and sear slide being mounted on said breech bolt in coacting relation whereby movement of the latter causes the former to release said firing pin, a trigger mounted for rocking movement, means to rock said trigger, and means on said trigger to engage said sear slide, said means being adapted to yield in a direction approximately parallel to the path of reciprocation of the breech bolt.

19. In an automatic gun, a carrier containing a trigger, a housing attached to said carrier, a two piece piston reciprocatively mounted in the housing and extending into the carrier.

20. A piston for automatic guns comprising a reciprocating member having a socket in one end thereof, a second member having a head seated in the said socket, and a spring to retain said second member in said first member.

21. In an automatic gun, a reciprocating breech block having a groove in the side thereof, a sear operating member in the rear face of the breech block in alinement with said groove, and a trigger in alinement with said groove and adapted to be continuously operated, said trigger being adapted to yield in the direction of reciprocation of the breech bolt when it overlaps the sear operating member.

22. In an automatic gun, a receiver, a breech bolt reciprocatively mounted therein, a movable sear carried thereby, a housing mounted on a wall of said receiver, and means in said housing operatively connected with said sear for moving it in one direction.

23. In an automatic gun, a receiver, a breech bolt reciprocatively mounted therein, a sear slidably mounted in said breech bolt, a housing carried by a wall of the receiver, and means in said housing operatively connected with said sear for sliding it in one direction.

24. In an automatic gun, a receiver, a breech bolt reciprocatively mounted therein, a sear slidably mounted on said breech bolt, a housing carried by a wall of said receiver, and means in said housing and operatively associated with said sear for transmitting impulses from a distance to said sear to cause the operation thereof in one direction.

25. In an automatic gun, a receiver, a breech bolt reciprocatively mounted therein, a sear slidably mounted on said breech bolt, a housing carried by a wall of said receiver, and means in said housing cooperating with said sear to cause the movement thereof in one direction.

26. In an automatic gun, a breech bolt, a firing pin carried by said breech bolt, a sear reciprocatively mounted on said breech bolt and adapted to engage said firing pin, a sear operating member reciprocatively mounted on said breech bolt, and a surface on one of said two last named members oblique to its path of reciprocation whereby reciprocation of said sear operating member moves the sear out of engagement with said firing pin.

27. In an automatic gun, a breech bolt, a sear slidably mounted on said breech bolt, a sear operating member reciprocatively mounted on said breech bolt, and a surface on one of said two last named members oblique to the path of movement of one of said members and adapted to contact with the other of said members whereby movement of said sear operating member operates said sear.

28. In an automatic gun, a receiver, a breech bolt reciprocatively mounted therein, a sear mounted on said breech bolt for vertical reciprocation, a sear operating member mounted on said breech bolt for horizontal reciprocation, a housing carried by one wall of said receiver, a trigger mounted in said housing, said trigger being adapted to engage said sear operating member through a slot in said wall, and coacting means on said sear and sear operating member whereby reciprocation of the latter causes reciprocation of the former.

29. In an automatic gun, a receiver having a slot in one wall thereof, a breech block reciprocatively mounted in said receiver, said breech block having a longitudinal groove, a sear and a sear operating member reciprocatively mounted on the rear part of said breech block, said sear operating member extending across said groove, a housing carried by said wall, a trigger in said housing, a dog on said trigger adapted to project through said slot to engage said sear operating member, said dog being adapted to yield if engaged by said sear operating member during the reciprocation of said breech block, and means for continuously vibrating said trigger.

30. In an automatic gun, a receiver, a reciprocating breech bolt having a longitudinal groove therein, a member reciprocatively mounted on said breech bolt and extending across said groove, a trigger, and a dog on said trigger adapted to engage the end of said member, said dog being adapted to yield in one direction of reciprocation of said breech bolt.

In testimony whereof, I hereunto affix my signature.

CARL G. SWEBILIUS.