July 18, 1944. G. WEBB 2,354,079

ROUNDS COUNTER FOR AUTOMATIC FIREARMS

Filed Sept. 27, 1941 2 Sheets-Sheet 1

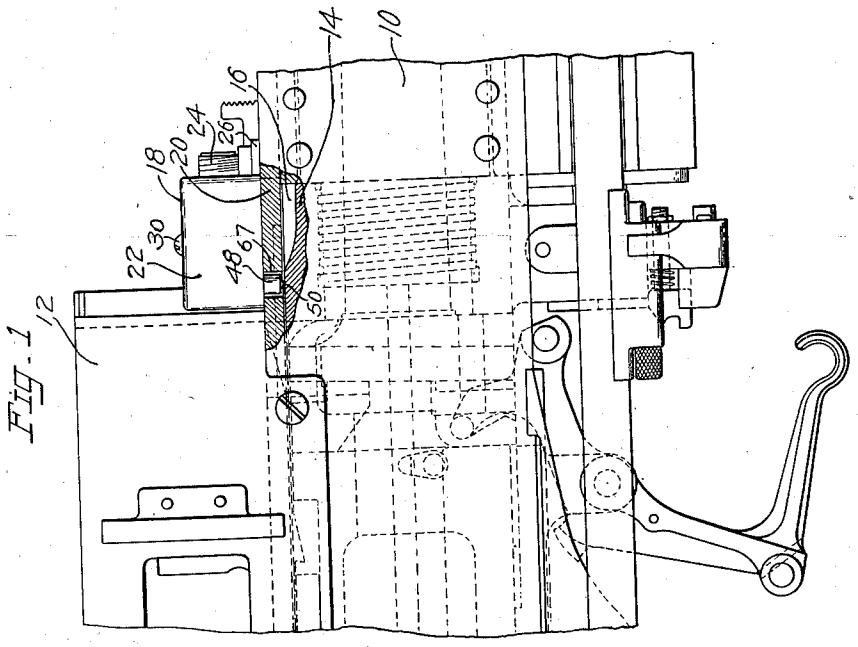


Fig. 1

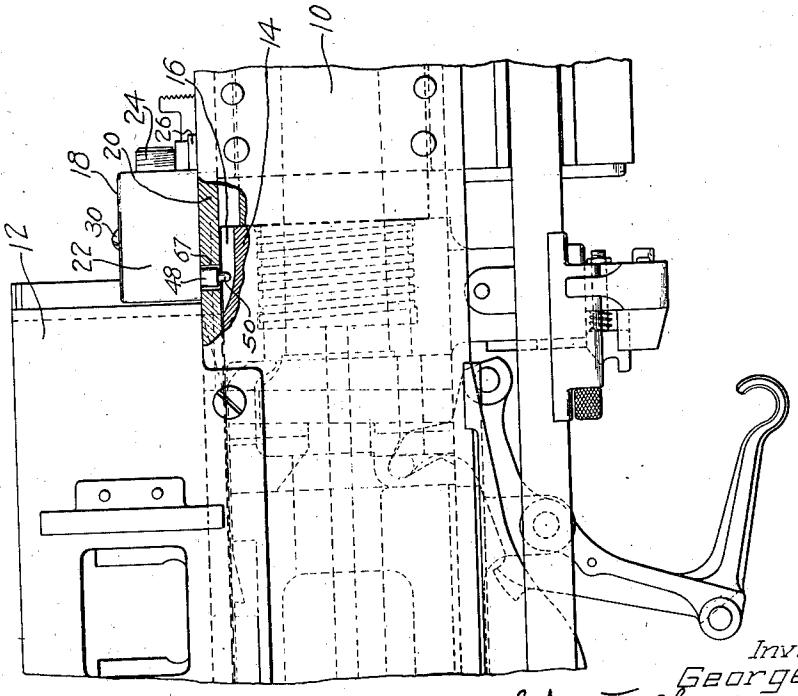


Fig. 2

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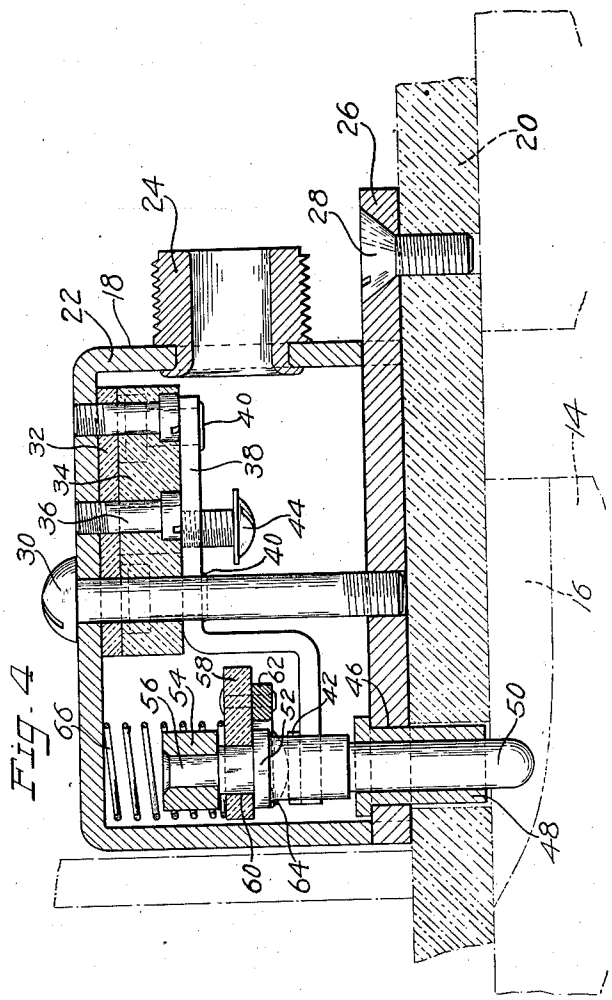


Fig. 4

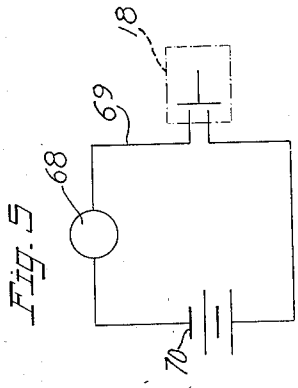


Fig. 5

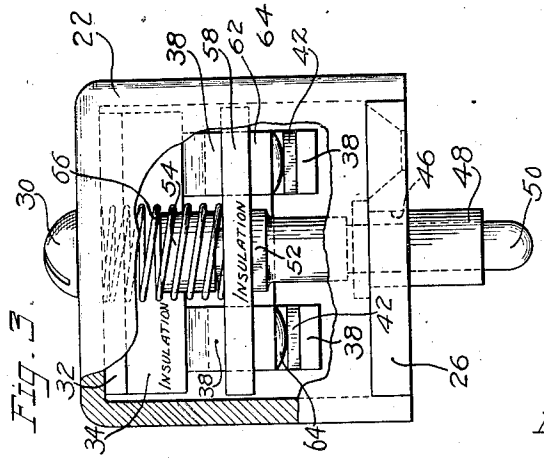


Fig. 3

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ROUNDS COUNTER FOR AUTOMATIC FIREARMS

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Application September 27, 1941, Serial No. 412,565

5 Claims. (Cl. 42—1)

This invention relates to a mechanism for counting and registering the number of rounds of ammunition fired by an automatic firearm.

One of the objects of the invention is to provide mechanism for actuating with certainty a counter and register through the medium of certain movable parts of the firearm. Another object of the invention is to provide means to actuate an electrically operated counter and register, the actuating means being so designed that normal vibration or jarring of the gun will not accidentally operate the counter to register a false count.

A still further object of the invention is to provide a switch adapted to be opened and closed by the movement of the barrel extension of an automatic firearm, the closing of the switch actuating a counter for indicating the number of rounds fired by the firearm. The construction is such that the switch is held closed to actuate the counter during the major portion of the cycle of movement of the barrel extension and that the switch is positively held in open position while the firing of the shell or cartridge occurs whereby the extreme vibration imposed upon the entire firearm due to such firing will in no way jar the switch closed before its normal time for closing.

Other objects of the invention will be apparent from the study of the specification and drawings which form a part thereof.

The accompanying drawings show the embodiment of the invention which is deemed preferable, 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.

In the drawings,

Fig. 1 is a fragmentary view of the breech casing and certain associated parts of an automatic firearm shown in side elevation with a switch mounted thereon, the switch being in open position and the barrel extension being forward in firing position.

Fig. 2 is a view similar to Fig. 1 showing the barrel extension retracted sufficiently to permit the switch to close.

Fig. 3 is an end elevation of the switch per se with the casing partly broken away to expose component parts of the switch.

Fig. 4 is a sectional side elevation of the switch member mounted on the firearm, only those parts of the firearm adjoining the switch being illustrated, the latter being in dot-and-dash lines; and

Fig. 5 is a diagram of the electric circuit connecting the component parts forming the instant invention.

The structure of the present invention, for purposes of convenience, has been illustrated in connection with a 37 mm. automatic firearm, the details of which firearm in general are fully set forth in applicant's co-pending application Serial No. 325,405 filed March 22, 1940. Said co-pending application also is based on and refers to U. S. Patent 1,525,065 to Browning, dated February 3, 1925, to which attention is also directed. The instant illustration, however, is in no way to be considered restrictive but merely illustrative since the details of the invention may be readily applied to other types of automatic firearms and function in the manner contemplated in connection with the present illustration.

In certain uses of automatic firearms as on aircraft, for example, it is difficult for the gunner to ascertain how many rounds of ammunition have been fired and similarly the number of rounds remaining in the magazine to be fired. The instant invention, while applicable to numerous types of automatic firearms, has been found particularly useful in connection with automatic firearms wherein the number of rounds of ammunition usually carried by the magazine is limited and it is quite vital for the gunner to know especially how many rounds of ammunition remain to be fired.

In aircraft, the firearm is frequently mounted in positions remote from the gunner's compartment whereby it is impossible for the gunner to see the magazine or reload the same in flight. Upon the magazine becoming exhausted of shells or cartridges, the gunner must return to a base for reloading of the magazine. Also, since enclosed magazines are generally used on the types of automatic firearms with which the use of the instant invention is contemplated, it is substantially impossible for the gunner to ascertain the number of shells or cartridges remaining in the magazine even if he could see the magazine. Furthermore, as it is essential for the gunner to know the number of rounds of ammunition remaining in his magazine before engaging in battle under the circumstances described above, the instant invention has been developed to provide a counter and register mechanism and means to actuate the same whereby the gunner may be furnished with the accurate desired information.

Previous attempts have been made to provide

rounds counters and indicators on automatic firearms, the actuation of the counters and indicators depending upon the movement of the belt of ammunition into the breech casing, for example, which counters and indicators possessed faults resulting in inaccurate counts. The mechanism forming the instant invention, however, only counts the actual firing of each cartridge or shell, immediately after the firing, whereby an accurate count is assured.

The mechanism comprising the present invention includes a switch member preferably placed on the top plate of the breech casing of an automatic firearm with an actuating means for the switch extending through a suitable aperture in said top plate. The barrel extension of the firearm is provided with a cam groove with which the actuating means for the switch coacts to open and close the switch as the barrel extension moves backward and forward in recoil and counter-recoil movement. The switch is connected in a circuit including electric power source and counter mechanism for indicating the number of rounds of ammunition fired. The counter mechanism may be mounted in any convenient position such as on the instrument panel of an airplane or even on the firearm in any convenient location.

In the present illustration the switch has been placed on the top plate of the breech casing just forward of the feed box adjacent one side of the breech casing as the preferred location. It is to be understood that the illustrated location of the switch and cam groove in the barrel extension may be changed and said switch and cam groove may be placed in any other convenient location on the firearm wherein the principles of the invention may be carried out within the spirit contemplated, all of which are described herein.

In the drawings, a fragmentary portion of the breech casing **10** is shown with a part of a feed box **12** mounted on the top thereof. Various parts of the operating mechanism of the firearm are shown depending below the breech casing, all of which mechanism is explained in detail in said co-pending application and patent. Further description of details of the operation of the firearm proper will not be made in this application since the same does not form an integral part of the present invention other than the operation of the parts of said firearm immediately associated with the elements comprising the instant invention. For a detailed description of the operation of such additional illustrated mechanism, attention is invited to said co-pending application and patent.

A barrel extension **14** is movable in a reciprocating manner within the breech casing by the firing of the firearm due to the recoil and counter-recoil forces imposed upon the barrel extension.

A longitudinally extending groove **16** is provided in the upper surface of said barrel extension near the forward end thereof, the bottom of the groove being parallel to the top of the barrel extension for part of its length and then curving upward to meet the upper surface of the barrel extension as well illustrated in Figs. 1, 2 and 4. A switch **18** is mounted on the top plate **20** of the breech casing. The switch consists of a casing **22** having an electrical conduit inlet bushing **24** mounted in the forward wall thereof. The bushing **24** is preferably externally threaded to accommodate a coupling for said electrical conduit. A base plate **26** on the switch is secured to the top plate **20** by means of a suitable screw **28**. The casing **22** is secured to the base plate by a screw **30**.

A plurality of insulation blocks **32** and **34** are secured to the upper wall of the casing by screws **36**. A pair of bus bars or conductors **38**, arranged substantially parallel to each other, are secured to the insulating block **34** by rivets **40**, one end of each of said conductors having contact members **42** secured thereto. The rivets **40** are insulated from the casing **22** by insulation block **32**. Screws **44** are also threaded into the respective conductors to secure the wires of the electric circuit to the respective conductors.

Vertically disposed in an aperture **46** in the base plate is a bushing **48**, preferably formed of bronze, in which a movable means illustrated as a plunger **50** is disposed for free vertical sliding movement, the plunger **50** having a rounded lower end. Said plunger has an annular flange portion **52** formed thereon intermediate of its length and a collar **54** is riveted onto a reduced portion **56** formed on the upper end of the plunger. An insulating block **58** having an aperture **60** to receive the plunger **50** is mounted on the plunger between the collar **54** and the flange **52** for vertical movement with the plunger. The collar **54** is spaced from the flange **52** a greater distance than the thickness of the insulating block **58** whereby a limited amount of vertical movement of the insulating block is permitted on the plunger **50**.

Riveted or otherwise suitably secured to the insulating block **58** is a U-shaped metallic bar **62** having contact members **64** disposed at opposite ends thereof. Said contacts are adapted to respectively engage the contacts **42** for effecting a closed circuit between the ends of the electric circuit wires disposed in the switch casing. A coiled helical spring **66** surrounds the collar **54**, which spring is sufficiently long to extend upward to engage the upper inside surface of the casing **22** to normally exert pressure downward on the insulating block **58**, whereby the bar **62** carries the contacts **64** into circuit closing relationship with the contacts **42**.

The top plate **20** of the breech casing is also provided with a suitable opening or aperture **67** to freely accommodate the bushing **48** and plunger **50**, the lower end of the plunger normally extending below the underside of the top plate **20** a substantial amount as shown in Figs. 2 and 4.

The counter **68**, which is electrically operated is of conventional design and construction, being the type that registers a count each time the circuit in which the counter is connected is closed.

The counter **68** is connected in series in the circuit by conventional wiring **69**, shown in Fig. 5, with a suitable electric power source **70** which has been illustrated in said figure as a conventional battery. It is to be understood that this power source, however, may be any other satisfactory equivalent such as a generator or current from a power line, for example. The switch **18** is diagrammatically shown also connected in series in the circuit shown in Fig. 5.

As an example of the cycle of operation of the applicant's construction, assume the barrel extension is in its forward position in the breech casing and the switch is held open by the plunger **50** which is pressed upward by the barrel extension as shown in Fig. 1. The cartridge or shell is then fired. Immediately upon the firing of the shell or cartridge, the barrel extension is quickly moved toward the rear of the breech casing by the recoil action of the firearm, during which movement of the barrel extension, the plunger **50** is caused to ride down the curved bottom of the groove **16** until the contacts **64** and **42** come in

engagement with each other through the action of spring **66** forcing downward the plunger **50** which carries contacts **64**. The engagement of said contacts will thus close the circuit and effect another actuation of the counter for the firing which has just taken place. The contacts will remain in circuit closing relationship during the majority of the cycle of movement of the barrel extension, thus insuring a certain actuation of the counter and preventing the possibility of a false actuation of said counter which might occur in the case where the circuit was closed only for a very brief interval during the cycle of movement of the member which closed the switch. The spring **66** is sufficiently strong to prevent vibrations imposed upon the firearm from accidentally opening the switch while the barrel extension is in retracted position and out of contact with the lower end of the plunger **50**.

When counter-recoil movement of the barrel extension takes place, the bottom of groove **16** will engage the lower end of plunger **50**, near the end of the forward movement of the barrel extension, to force the plunger upward and open the circuit by moving contacts **64** away from contacts **42**.

The switch is thus held open with certainty, in circuit breaking position, while the cartridge or shell in the firearm is actually being fired. This is the occasion when the maximum amount of vibration is imposed upon the entire firearm and any mechanism carried thereby. There is therefore no possibility of the switch accidentally closing while such maximum vibration occurs, thus insuring accuracy in the operation of the counter connected in the circuit of the device during all phases of operation of the structures.

While the invention has been illustrated and described in its preferred embodiment and has included certain details, it is to be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways, falling within the scope of the invention as claimed.

What I claim is:

1. The combination of an automatic firearm including means movable upon each firing of said firearm. an electrically actuated counter, an electric power source, a switch, a circuit connecting said counter, electric power source and switch, and means actuated by said movable means upon movement thereof to operate said switch and open and close said circuit to actuate said counter, said switch operating means holding the switch open at the time of firing said firearm.

2. The combination of an automatic firearm including means movable upon each firing of the firearm, an electric switch mounted on said firearm, an electrically actuated counter, an electric power source, a circuit connecting said switch, counter and electric power source, and means freely biased in one direction and actuated by said movable means upon movement thereof to operate said switch and open and close said circuit to actuate said counter to register each firing of said firearm, said switch operating means holding the switch open at the time of firing said firearm.

3. The combination of an automatic firearm including a breech casing having a member movable therein upon each firing of the firearm, an electric switch mounted on said firearm, an electrically actuated counter, an electric power source, a circuit connecting said switch, counter mechanism, and power source, and means freely biased in one direction and actuated by said movable member upon movement thereof to operate said switch and open and close said circuit to actuate said counter and register each firing of said firearm, said biased means holding said switch open at the time of firing said firearm.

4. The combination of an automatic firearm including a breech casing having a barrel extension provided with a cam surface and movable in said breech casing upon each firing of the firearm, an electric switch mounted on said breech casing, an electrically actuated counter, an electric power source, a circuit connecting said switch, counter, and electric power source, and means freely biased in one direction and engageable by said cam surface on said barrel extension for actuation thereby upon movement thereof to operate said switch and open and close said circuit, to actuate said counter and register each firing of said firearm, said barrel extension and last mentioned means holding said switch open at the time of firing said firearm.

5. The combination of an automatic firearm including a breech casing having an opening therethrough and a member provided with a cam surface and movable in the breech casing upon each firing of said firearm, an electric switch mounted on said breech casing, a switch actuating member projecting and freely movable through said opening in said breech casing and also engageable with the cam surface of said member, means normally biasing said actuating member toward switch closing position, an electrically actuated counter, an electric power source, and a circuit connecting said switch, counter and electric power source, said cam surface on said member engaging said switch actuating member at the time of firing of the firearm to maintain said switch in open position to break the circuit and said cam surface also being movable with said member to release said switch actuating member following the firing of the firearm to permit closing of said switch and circuit to actuate the counter and register each firing of the firearm.

GEORGE WEBB.