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H. LIPPERT ET AL
AUTOMATIC FIREARM

2,380,455

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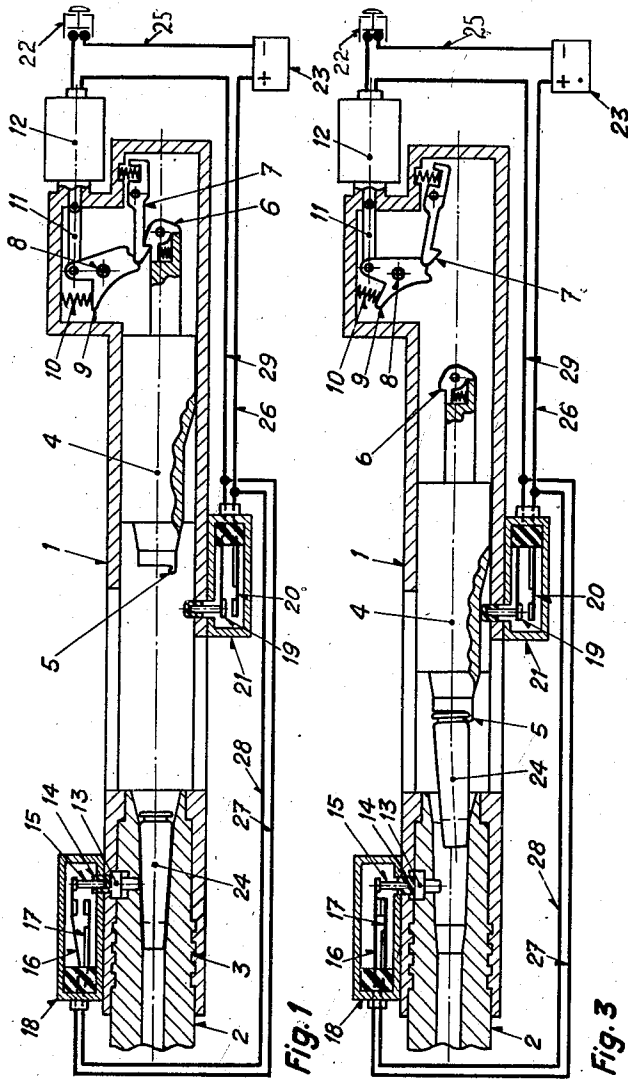


Fig. 1

Fig. 3

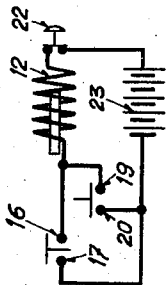


Fig. 2

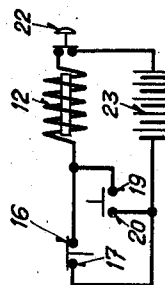


Fig. 4

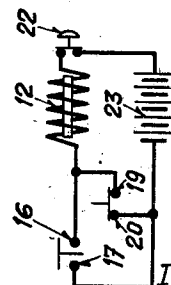


Fig. 5

INVENTORS
HANNS LIPPERT
AND ERWIN HEPPERLE

By

ATTYS.

UNITED STATES PATENT OFFICE

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AUTOMATIC FIREARM

Hanns Lippert and Erwin Hepperle, Zurich,
Switzerland

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9 Claims. (Cl. 89—28)

It has been proved to be necessary in automatic firearms to provide double loading safety devices which lock the breech block movement if, for any reason whatsoever, during continuous firing a spent cartridge case is not extracted from the cartridge chamber. The known double loading safety devices essentially comprise a feeler member which mechanically locks the breech block movement if a spent cartridge case remains in the cartridge chamber. These mechanical double loading safety devices have proved to be very good and are in use in most firearms. Cases are known, however, especially in automatic firearms arranged in aircraft, in which the mechanical double loading safety device leads to difficulties, owing to the necessary effective connection of the feeler member arranged at the cartridge chamber to the breech block, since in some circumstances in firearms of this type the movement of the breech block does not reach as far as the zone in the neighbourhood of the feeler member. Further, the mechanical double loading safety device leads to an increase of the weight and of the moving parts of the firearm, both of which are undesirable.

The object of the present invention is to provide an automatic firearm in which these difficulties are avoided.

According to the present invention, an automatic firearm is provided with an electric double loading safety device using the trigger as a locking mechanism for the movement of the breech block mass, in which the feeler member at the cartridge chamber controls a contact or switch which is situated in the circuit of an electromagnet actuating the trigger and, in the path of the breech block, there is provided a further contact or switch controlled by the said breech block which can close the circuit of the electromagnet when the contact of the feeler member is cut out.

The nature of the invention can be better explained by describing one constructional form which is shown by way of example, on the accompanying drawing, whereon:

Figure 1 is a diagrammatic representation of the firearm with the cartridge case not extracted from the chamber;

Figure 2 is the circuit diagram corresponding to the position of the parts shown in Figure 1;

Figure 3 is a view similar to Fig. 1 showing the firearm when the cartridge case is being extracted in the normal way;

Figure 4 is the circuit diagram corresponding to the position of the parts shown in Figure 3; and

Figure 5 is a circuit diagram for explaining the action of the contact or switch controlled by the breech block.

Referring to the drawing:

The barrel 2 with its cartridge chamber is fixed in the breech casing 1 by means of a bayonet joint 3. The reciprocating breech block 4 is provided at its front end with an extractor claw 5 and at its rear end with a hook 6 with which a hook 7 is adapted to engage, the hook 7 being pressed down onto the hook 6 by a locking member 9 arranged to turn on a pin 8. The locking member 9 is held in its locking position by a spring 10 and it is connected to a magnet 12 by a rod 11. In the cartridge chamber there is provided a pin 13 acting as the feeler member of the double loading safety device and a pin 15 arranged in an insulating ring 14 acts upon the pin 13 in order to control the movement of a spring contact 16 toward and from a contact 17. The contacts 16 and 17 are situated in a housing arranged on the breech casing. An insulated contact pin 19 and a counter contact 20 are also movably arranged on the breech casing, the contact pin and the counter contact being situated in a housing 21. The trigger contact is indicated at 22, 23 is the current source, and a spent cartridge case is shown at 24.

The circuit of the individual contacts is as follows: From the current source 23 one pole leads to the trigger contact 22 through a lead 25 and thence to the magnet 12. The other pole of the source 23 is connected to the contact 20 through a lead 26 and to the contact 17 through a lead 28. The contacts 16 and 19 are connected to the magnet 12 through the leads 27 and 29.

The manner of operation of the double loading safety device is as follows: Assuming in all cases that the trigger contact 22 is closed and the firearm therefore is firing continuously, at the beginning of the firing no cartridge is in the cartridge chamber and hence the contact 16 lies on the contact 17. When the trigger contact 22 is depressed the circuit is closed through the leads 26, 27, 28 and 29, the magnet 12 is energized and the breech block 4 is released by the rocking of the bottom part of the member 9 to the left as shown in Figure 3, the hooks 6 and 7 then disengaging. The positions of the contacts are shown in Figure 4. The breech block travels forwards and inserts a cartridge into the cartridge chamber, whereupon the contact 16 is lifted from the contact 17 by the outward movement of the pins 13 and 15, which latter is forced outwards by the cartridge case. The circuit would then be

broken and the magnet 12 de-energised, but in order to avoid this breaking of the circuit, the contact 19 is arranged in the path of the breech block 4 and the contacts 19 and 20 close the circuit on the forward run of the breech block 4, see Figure 5, so that the magnet 12 is still energised. If the cartridge case 24 is extracted after firing, the contacts 16 and 17 are closed and, in spite of the fact that the contacts 19 and 20 are opened by the returning breech block 4, the circuit remains closed as shown in Figure 4. If for any reason the cartridge case is not extracted, however, the contacts 16 and 17 remain open and on the recoil of the breech block, the contacts 20 and 21 are also opened and the circuit is broken. The magnet 12 is then de-energised and the locking member 9 is depressed by the spring 10 on to the hook 7 which, as shown in Figure 1, engages in the hook 6 on the breech block and holds the breech block in the rearward recoil position. Even if the trigger contact 22 is depressed, firing is stopped and it becomes apparent to the gunner that a fired cartridge case remains in the barrel.

What we claim and desire to secure by Letters Patent is:

1. An electrically operated double loading safety device for automatic firearms comprising, in combination with the cartridge chamber and the breech block of the firearm, locking mechanism for releasably holding the breech block in recoil position, an electro-magnet arranged to control said locking mechanism, a feeler member at the cartridge chamber in position to be actuated by the insertion and extraction of a cartridge, an electric switch controlled by said feeler member and arranged in the circuit of the electro-magnet, a second feeler member arranged in the path of the breech block, and a second switch controlled by the said second feeler member and arranged to close the circuit of the electro-magnet when the switch controlled by the first feeler member is opened.

2. An electrically operated double loading safety device for automatic firearms comprising, in combination with the cartridge chamber and the breech block of the firearm, locking mechanism for releasably holding the breech block in recoil position, an electromagnet arranged to control said locking mechanism, a feeler member at the cartridge chamber and responsive to the presence and absence of a cartridge in such chamber, an electric switch controlled by said feeler member and arranged in the circuit of the electro-magnet, said switch being normally closed in the absence of a cartridge in the chamber but being opened when a cartridge is inserted into the chamber, a second feeler member arranged in the path of the breech block, and a second switch controlled by said second feeler member, said last mentioned switch being arranged to open and close said circuit and being normally open when the block is in retracted position but being closed by the breech block when the latter is in an advanced position, the arrangement being such that the electro-magnet is deenergized if a cartridge case is not extracted from the chamber after firing, the

breech block being then locked against movement at the end of its recoil upon opening of the electromagnet circuit.

3. A firearm according to claim 2, wherein the locking mechanism includes a locking hook arranged to be actuated by the electro-magnet, the breech block having a hook arranged to be engaged by the first mentioned hook, the locking mechanism acting, by engagement of the hooks, to lock the breech block against forward movement when the magnet circuit is open.

4. A safety device for automatic firearms according to claim 1, wherein the feeler member at the cartridge chamber comprises a slidable pin which normally projects into the chamber, and a second, insulated pin actuated by the first pin and arranged to control the associated switch.

5. A safety device for automatic firearms according to claim 1, wherein the switch operated by the breech block is connected to an insulated pin which projects into the breech casing in the path of the breech block.

6. A safety device for automatic firearms according to claim 1, including a trigger switch arranged in said circuit to cause energization of the electro-magnet upon actuation thereof.

7. An electrically-operated safety mechanism for automatic firearms comprising, in combination with the breech block and cartridge chamber of the firearm, locking mechanism for holding the breech block in its rearward position, an electro-magnet arranged to release the locking mechanism upon energization thereof, means for returning the locking mechanism to breech block locking position upon de-energization of the electro-magnet, a pair of contacts at the cartridge chamber in position to be actuated by the insertion and extraction of a cartridge and a second pair of contacts arranged along the path of movement of the breech block and controlled thereby, the two pairs of contacts being arranged in parallel in the circuit of the electro-magnet whereby the electro-magnet becomes de-energized only when both pairs of contacts are open.

8. An electrically-operated safety mechanism for automatic firearms comprising, in combination with the breech block and cartridge chamber of the firearm, locking mechanism for holding the breech block in its rearward position, an electro-magnet arranged to control the locking mechanism, a pair of contacts at the cartridge chamber in position to be actuated by the insertion and extraction of a cartridge and a second pair of contacts arranged along the path of movement of the breech block and controlled thereby, the two pairs of contacts being arranged in parallel in the circuit of the electro-magnet whereby the electro-magnet becomes de-energized only when both pairs of contacts are open.

9. A safety device for automatic firearms according to claim 7, including a pair of contacts arranged at the trigger and in series with the contacts at the cartridge chamber, whereby upon closing of the trigger contacts, the electro-magnet becomes energized.

HANNS LIPPERT.
ERWIN HEPPELLE.