

April 11, 1961

C. ROUBY

2,978,827

MEANS FOR ELECTRICALLY FIRING FIRE-ARMS

Filed June 15, 1956

4 Sheets-Sheet 1

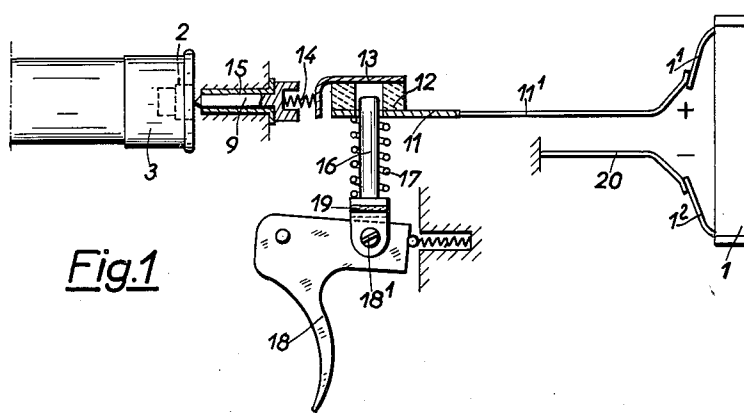


Fig. 1

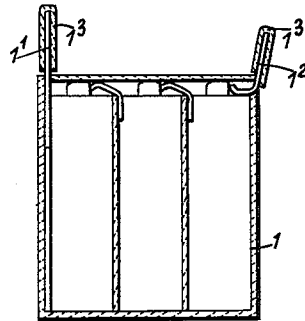


Fig. 2

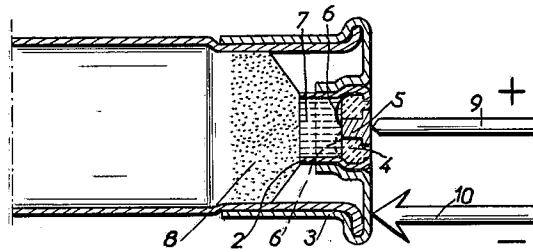


Fig. 3

INVENTOR

Charles Rouby

BY

J. Delator Seguy

ATTORNEY

April 11, 1961

C. ROUBY

2,978,827

MEANS FOR ELECTRICALLY FIRING FIRE-ARMS

Filed June 15, 1956

4 Sheets-Sheet 2

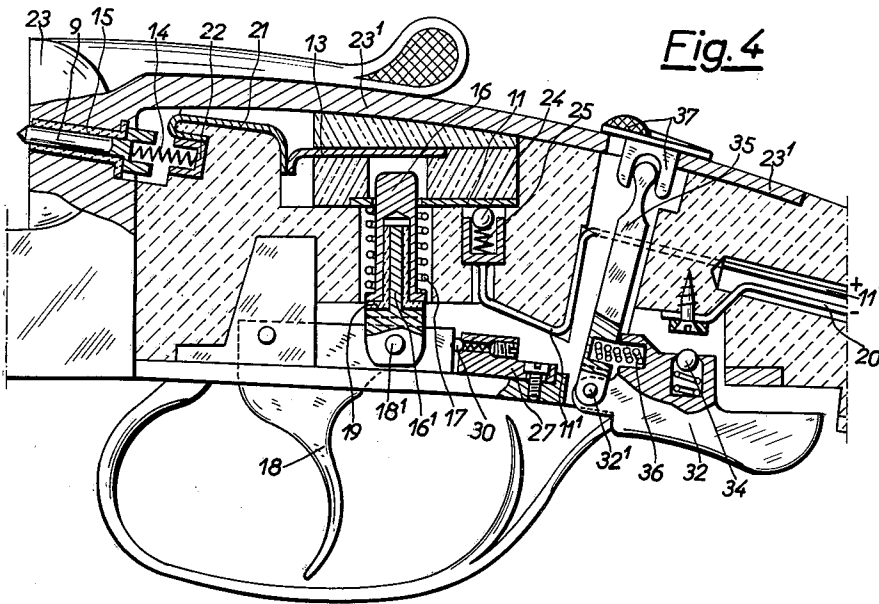


Fig. 4

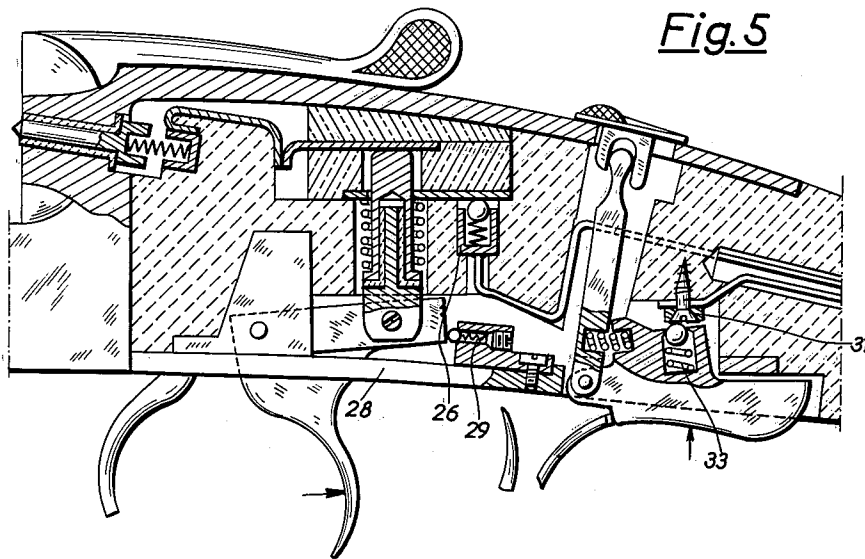


Fig. 5

INVENTOR

Charles RoubY

BY

J. Slaton - Seguy

ATTORNEY

April 11, 1961

C. ROUBY

2,978,827

MEANS FOR ELECTRICALLY FIRING FIRE-ARMS

Filed June 15, 1956

4 Sheets-Sheet 3

Fig.6

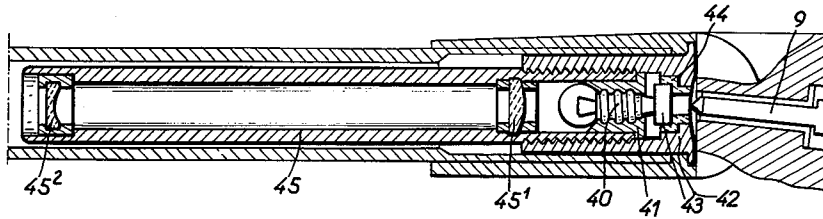


Fig.7

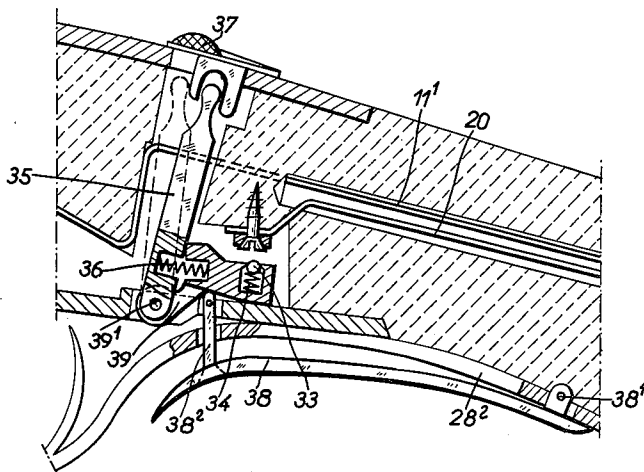
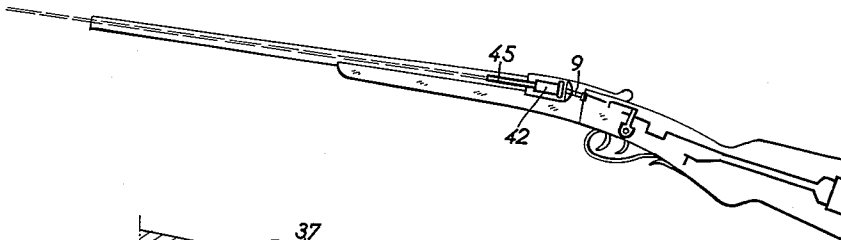


Fig.8

INVENTOR

Charles Rouby

BY

J. Delattre-Seguy

ATTORNEY

April 11, 1961

C. ROUBY

2,978,827

MEANS FOR ELECTRICALLY FIRING FIRE-ARMS

Filed June 15, 1956

4 Sheets-Sheet 4

Fig.9

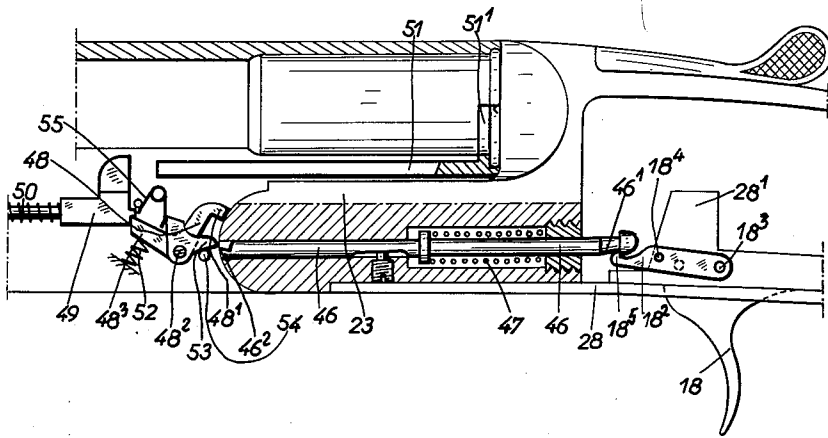


Fig.10

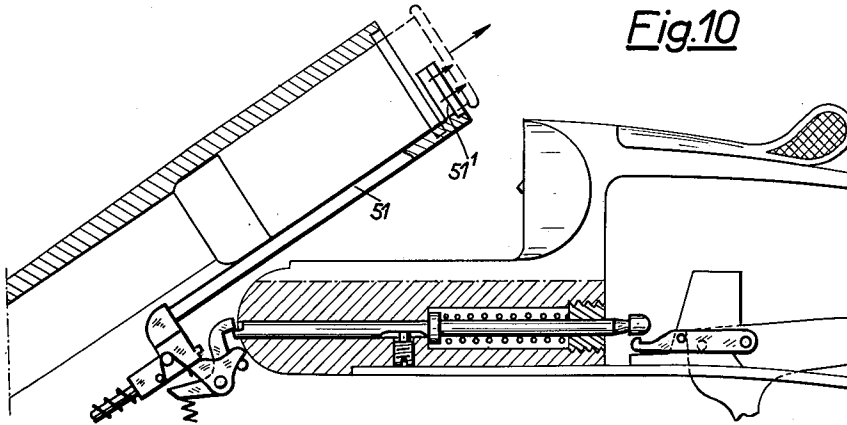
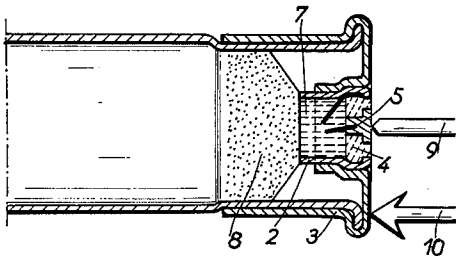


Fig.11



INVENTOR,

Charles ROUBY

BY

J. Delator-Seymour

ATTORNEY

1

2,978,827

## MEANS FOR ELECTRICALLY FIRING FIRE-ARMS

Charles Rouby, St.-Etienne, France, assignor to Societe Moderne de Fabrications Mecaniques, St.-Etienne, France, a French limited-liability company

Filed June 15, 1956, Ser. No. 591,736

Claims priority, application France Apr. 20, 1956

11 Claims. (Cl. 42-84)

In fire arms of any type used for hunting, shooting, self-protection, war, etc. the cocking and percussion mechanisms are generally, as is well known, intricate and expensive. These mechanisms lead also to numerous difficulties and failures in operation.

The present invention has for its object to substitute for the conventional cocking and percussion mechanisms inserted between the mechanism controlling the firing and one or more triggers on the one hand and the cartridge or cartridges on the other hand, an electrical firing system incorporating the following characteristic features or arrangements:

A battery or the like source of electric current fitted preferably inside the fire arm or else adapted to be connected readily and speedily with the latter.

An electric circuit formed inside the fire arm so as to interconnect the above mentioned battery or like source of electric current with the cartridge cap forming the primer. A part of the circuit is formed by the mass constituted by the metal section of the fire arm, connected with a terminal of the battery or like source of electric current.

A switch for the electric circuit, which is controlled at the moment of the firing by a mechanism including one or more triggers.

A primer of a particular design fitted on the cartridge with a view to operating under control of the current fed by said circuit for igniting the gunpowder.

A further object of the invention is constituted by an arrangement incorporating said electric firing means and provided with novel and reliable means for its operation. This arrangement includes also an automatic double acting safety system associated with the electric circuit of the above defined type so as to prevent any fortuitous undesired operation.

In order to clearly disclose the object of the invention, without however limiting its scope, the accompanying drawings are referred to hereinafter, in which drawings:

Fig. 1 is a diagrammatic view of the basic components of an electric firing system incorporating the principle of the invention.

Fig. 2 shows by way of example an electric battery in the form of a primary cell of any suitable type the terminals of which are provided with an insulating sheath which may be readily removed at the moment of use.

Fig. 3 is a sectional view of the end of a cartridge to show a preferred embodiment of a primer adapted to cooperate with said electric firing system.

Figs. 4 and 5 are two similar views illustrating partly in cross-section a shotgun including by way of example an electric firing system with double safety means; in

2

Fig. 4, said arrangement is illustrated when inoperative with the safety system engaged; in Fig. 5, the same arrangement is shown at the moment of operation of the electric firing system while the safety system is obviously released.

Fig. 6 is an axial cross-section of a removable luminous projector which serves for training purposes, said projector being shown by way of example as positioned inside a fire arm drawn in thinner lines and equipped with the electric firing system according to the invention.

Fig. 7 illustrates on a reduced scale, the mounting of the arrangement according to Fig. 6 with reference to a diagrammatic showing of the electric firing system.

Fig. 8 illustrates a second embodiment together with an alternative manner of mounting the double acting automatic safety means incorporated in the electric firing arrangement.

Figs. 9 and 10 illustrate an embodiment of an automatic ejecting mechanism operating in combination with the electric firing system and shown with said mechanism respectively as set before firing, and after firing and opening of the gun at the moment of the ejection of the cartridge.

Fig. 11 is a sectional view of the end of a cartridge showing a modified embodiment of a primer adapted to cooperate with said electric firing system.

The essential parts of the electric firing system according to the invention are, as illustrated in a non-limiting sense in Fig. 1, in the first place, a source of electric current which may be constituted advantageously but not necessarily by a battery having a primary cell 1. Said cell battery or the like source of electric current may be incorporated removably in the fire arm, for instance inside the suitably designed and recessed butt of said fire-arm, or in any other suitable manner. The cell battery or its substitute may be fitted on any other suitable part of the fire arm or even be independent of the latter and be connected with it only through electric leads. It should be considered that the possibility of removing the cell and disconnecting it from the fire arm provides absolute and complete safety.

In the case where a cell serves as a source of electric current, its terminals 1<sup>1</sup> and 1<sup>2</sup> are insulated by means of an insulating sheath 1<sup>3</sup> of any suitable known type (Fig. 2). This insulating sheath 1<sup>3</sup> is removed or torn off according to the case at the moment at which the cell is set in position for use. This insulation prevents any fortuitous ignition when the cartridges lie in bulk, for instance, with a battery.

The battery may also be of the type provided with hollow embedded terminals adapted to receive the male jacks. A fortuitous contact with the primer of the cartridges is thus made impossible. It is also feasible to enclose the cell or cells inside a casing of insulating material.

The battery or like source of electric current is associated with cartridges or missiles provided with a special primer 2 (Fig. 3) relying on the principle of the heating of an incandescent filament through which flows the current produced by the battery or like source. Said filament is in contacting relationship with a composition of any desired nature which may be ignited very easily so as to ignite in its turn the gunpowder inside the cartridge.

An interesting embodiment, which is by no means limitative, of such a cartridge is illustrated in Fig. 3 which

shows the casing 2 of the primer which is fitted removably with a force fit inside the case 3 of the cartridge. An annulus 4 of insulating material is set or otherwise secured inside the casing 2. A central contact piece 5 is fitted in its turn inside said insulating annulus 4. One or more electrically conductive wires 6 extend inside the casing 2 and connect the latter with the central insulated contact piece 5. The fact of using a plurality of wires ensures reliable operation of the system even in the case of a breakage of a wire. A special composition 7 which is readily inflammable and of any suitable known type is inserted in the casing 2 in contacting relationship with the wire or wires 6. Said composition is positioned in a manner such that it may produce a very easy ignition of the gunpowder 8 inside the cartridge. The reference numbers 9 and 10 designate diagrammatically the elements of the circuit described hereinafter, which allow the current to be fed from the battery or like source of current to the primer.

Obviously, when the circuit is closed, the electric current heats the leads 6 up to incandescence which causes the burning of the composition 7 in the primer and of the gunpowder 8 in the cartridge. In a similar manner and without widening the scope of the invention, it is possible to produce the ignition of the composition 7 of the primer through an electric arc or a spark which is caused to jump across two terminals 6a, forming a sparking gap located inside the composition 7 of the primer, said terminals being respectively connected with contact piece 5 and the primer casing 2, as shown in Fig. 11.

As far as small gauge ammunition is concerned, the casing 2 of the primer may constitute also the case of the cartridge and be in one piece therewith.

The electric circuit connecting the battery with the primer of the cartridge or cartridges includes a switch actuated by the control mechanism provided with one or more triggers adapted to open or close the circuit for firing or shooting.

Referring again to Fig. 1 showing in a rough manner the electric circuit which includes a lead 11<sup>1</sup> connecting the positive terminal 1<sup>1</sup> of the battery 1 with a small conductive plate 11, the latter is electrically insulated through the part 12 with reference to a further small conductive plate 13. The latter is in permanent contacting relationship with the conductive rod 9 with the interposition of a spring 14, said rod 9 engaging the central contact-piece 5 of the cartridge primer. The rod 9 is electrically insulated from the remainder of the fire arm by a sheath 15 of insulating material.

A contact-making stud 16 has its free end projecting through the plate 11 up to a small distance from the plate 13 away from which it is held by a spring 17 fitted between a shoulder on said stud 16 and the plate 11 connected with the lead 11<sup>1</sup>.

The opposite end of the stud 16 is pivotally secured at 18<sup>1</sup> to the trigger 18. However, the stud 16 is electrically insulated with reference to the trigger through the agency of an insulating layer 19 suitably inserted across the end of the stud 16 secured to the trigger and above the latter.

A further lead 20 connects the negative terminal 1<sup>2</sup> of the battery with the mass constituted by the metal sections of the fire arm so as to close the circuit over the case 3 of the cartridge and the casing 2 of the primer through said mass.

The operation of the electric firing system is obvious: when the trigger 18 is shifted upwardly, the stud 16 is necessarily also shifted upwardly against the pressure of the spring 17. As soon as the free end of the stud 16 engages the conductive plate 13, the electric circuit is closed and is energized so that the current may bring to incandescence the wire or wires 6 of the cartridge primer. This incandescence provides for the ignition of the latter and of the gunpowder.

There is illustrated in Figs. 4 and 5, relating by way of exemplification to a shotgun, a particularly interesting embodiment of the above described electric firing system.

This embodiment incorporates the main parts described with reference to Fig. 1 and illustrated in the latter. In the first place, the lead 21 connects the small conductive plate 13 with the spring 14 with the interposition of a bearing cup 22 for the spring 14. The rod 9 is electrically insulated with reference to the rocker member 23 of the fire arm by an insulating sheath 15.

The contact-making stud 16 includes two sections 16—16<sup>1</sup> of which the lower section 16<sup>1</sup> is pivotally secured to the trigger 18. The parts 16 and 16<sup>1</sup> are electrically insulated from each other by the layer 19 of insulating material.

To produce a clean permanent contact and to obtain an easier fitting of the lead 11<sup>1</sup> with reference to the conductive plate 11, said contact is produced through a ball 24 urged outwardly against said plate 11 by a spring 25, said ball and said spring being housed inside a cup or case 26 to which the lead 11<sup>1</sup> is welded or otherwise secured.

A small block 27 is secured to the plate 28 forming a trigger guard for the fire arm, immediately to the rear of the trigger 18. Inside said block 27 is housed a spring 29 urging a ball 30 into partial engagement with a small depression formed in the rear of the trigger 18. The ball 30 forms a stop positioning said trigger in non-operative position so that the trigger cannot be shifted except when a sufficient pressure of the operator's finger is exerted on said trigger. The small resistance thus arising from the ball 30 defines for the operator the moment of the firing and corresponds to the resistance met with in conventional fire arms operating through percussion. However, the mounting of such an arrangement including a spring-urged ball engaging the trigger is optional. The shooting of clay pigeons for instance may be performed with greater accuracy without said arrangement.

It is important to remark that by connecting the conductive plate 13 with a plurality of electrically conductive firing rods such as 9 which are carried by the same gun or by a plurality of separate guns, it is possible to obtain the simultaneous control of the firing of a plurality of shots.

By way of modifications falling within the scope of the invention as defined in the accompanying claims, I may mention:

The successive control through a single trigger of several shots through the provision of one or more contact-making studs 16 associated with a single trigger 18.

Also, the control of the firing through the closing of the circuit in the section of the latter which provides for the connection with the mass. In such a case, the current is fed directly to the conductive rod 9 which is in contacting relationship with the cartridge primer, while the trigger engages the mass or an extension thereof.

The electric firing arrangement illustrated in Figs. 4 and 5, shows a further considerable interest through its double acting automatic safety system. Said safety system provides for an automatic interruption of the current flowing through the mass when no firing is being contemplated while the continuity of the mass and of the passage provided therein for the current is automatically restored through the mere grasping of the gun prior to firing. The second action of the safety system is provided by an arrangement adapted to lock, as desired, in its circuit-interrupting position, the member controlling the passage provided for the current through the mass.

This is illustrated in Figs. 4 and 5, wherein the lead 20 connected with the negative terminal of the battery connects at its other end with a stationary contact-piece 31 attached to the stock. A safety lever 32 is connected pivotally for instance at 32<sup>1</sup> with the trigger guard 28 of the gun or in any other manner so that the safety lever

32 is automatically actuated as soon as the gun is grasped for firing.

Inside the lever 32 is housed a yielding contact-piece constituted by a ball 34 which is urged by its spring 33 toward and eventually against the contact-piece 31 so as to provide for the connection of the lead 20 with the mass.

On the other hand, to the front of the lever 32, a link 35 is secured pivotally at 32<sup>1</sup> through one of its ends while its other end engages and is controlled by a push member 37 carried slidingly on the tail-end of the rocker 23<sup>1</sup>. A spring 36 is fitted between the link 35 and the lever 32 so as to act as a spacing member between said parts.

With said safety system, the risks of a fortuitous undesired firing are cut out since if the trigger 18 is untimely actuated, this cannot lead to any firing as the connection of the circuit with the mass has been interrupted by the lever 32 lying in the normal inoperative position illustrated in Fig. 4. On the other hand, the pivoting of the lever 32 against the action of the spring 36 when the gun is taken hold of for firing is only possible if the link 35 and push member 37 have been previously shifted forwardly (Fig. 5). When the operator's hand is no longer in its operative position on the gun, the lever 32 is released and pivots automatically downwardly into its safety position under the action of the spring 36. The push member 37 and the link 35 can then be returned to the safety position shown in Fig. 4. It is thus true that the safety system is a double acting automatic system.

In Fig. 8 is illustrated a second embodiment with a different mounting and execution of the above described automatic double acting safety system. There is provided a safety lever 38 which is comparatively long and is pivotally secured at its rear end 38<sup>1</sup> to the tail piece of the trigger guard 28<sup>2</sup>. The front end of the lever 38 carries a push member 38<sup>2</sup> which may act against a pivoting lever 39 pivotally secured at 39<sup>1</sup>, and subjected to the pressure of a spring 36 urging it away from the link 35 while said lever 39 also carries a yielding contact system including a ball 34 and its spring 33. The elongated safety lever 38 allows producing easily and conveniently a contact with the mass when the marksman grasps the gun for firing. This arrangement accomplishes the substitution for the link 35 and for the push member 7 of a simpler manually operated safety system providing for the locking of the lever 38 so as to prevent any pivoting thereof.

Within the scope of the invention as defined in the accompanying claims, it is possible to produce an electric firing system associated with a removable training arrangement by means of a luminous projection.

As a matter of fact, it is known, that for training efficiently in an economical, instructive and silent manner, the actual firing of a missile is cut out and replaced by the production of a light beam to show materially, accurately and in a readily visible manner the geometrical firing line corresponding to the location and to the direction of the gun barrel at the moment at which the trigger is depressed. The aiming may be performed on various stationary or movable targets and preferably under subdued light conditions so as to make the impact of the light beam more readily visible.

To this end, there exist expensive arrangements which it is difficult to set on a gun and the accuracy of which is reduced by reason of the fact that these arrangements are fitted generally round the barrel and not axially of the latter. It is also necessary to equip the gun with a battery or the like generator of luminous energy and to establish a connection with the trigger or triggers for the closing of the circuit. When it is then desired to proceed with the actual firing, it is necessary to dismantle the whole arrangement.

With the arrangement according to the invention, it is possible to transform instantaneously and without any difficulty the electrically fired gun into a training gun producing a luminous beam defining the firing line. It is in

fact possible to use the already extant electric firing device including a battery, an electric circuit and a circuit-closing trigger of the type described forming a permanent fitting of the gun since this electric firing arrangement is an essential component to be used for actual firing and said electric firing device is associated with a removable arrangement for projecting a beam of light under control of the electric firing circuit.

This removable training arrangement is illustrated by way of example in Fig. 6. It includes chiefly an optic system located in front of a luminous source. In the example illustrated, the electric bulb 40 is screwed or otherwise secured inside a sleeve 41 fitted inside a dummy case 42, the outer size of which is that of a normal case of the type carried by the cartridges used with the gun considered, so that said dummy case may be fitted inside the chamber of the gun barrel in the same manner as a normal cartridge.

Through the bottom of the axial section of the dummy case 42 there extends a central contact-piece 43 against which bears the outer end of the socket of the bulb 40. A sheath 44 of insulating material is fitted between said contact-piece 43 and the dummy case 42. On the other hand, the contact-piece 43 engages the end of the conductive rod 9 of the electric firing device.

A tube 45 is screwed through one end into the outer end of the dummy case 42. Said tube has a diameter smaller than that of said dummy case so as to be readily introduced into the barrel without any contacting with the wall of the latter. The optic system is constituted by a plurality of lenses such as 45<sup>1</sup> and 45<sup>2</sup>, as illustrated by way of a mere exemplification since any other lens arrangement may be used for concentrating the luminous flux of the bulb into a very accurately limited luminous beam. Accuracy in training is improved by the fact that the arrangement defined is fitted inside the barrel of the gun.

It is readily apparent that each closing of the circuit through operation of the trigger 18 produces instantaneously an illumination of the bulb and the projection of a luminous beam along the axis of the gun barrel so as to simulate an actual shot. The removable arrangement used for the luminous projection allows also checking the condition of the electric generator, i.e. a cell battery in the present cases.

It is possible to remove instantaneously the dummy case 42 and the remainder of the associated arrangement so as to insert a true cartridge into the barrel for actual firing.

It is a well known fact that, in firearms providing for automatic ejection of cartridge cases after firing, said automatic ejection is produced through the conventional mechanism for the cocking and percussion of such guns.

With the above described arrangement for electrical firing, it is possible to obtain however an automatic ejection of the cartridge cases after the firing in a simple and efficient manner through the novel mechanism illustrated in Figs. 9 and 10 and operating in combination with the electric firing means.

In said mechanism, a link 18<sup>2</sup> is pivotally secured at 18<sup>3</sup> to the trigger or triggers 18 so as to move in a plane parallel therewith and it is also pivotally secured at 18<sup>4</sup> inside the upper extension 28<sup>1</sup> of the trigger guard 28. The forward end of said link 18<sup>2</sup> forms at 18<sup>5</sup> a hook adapted to engage a notch 46<sup>1</sup> at the rear end of a cocking rod 46. The link 18<sup>2</sup> forms thus a sort of tumbler in alignment with the cocking rod 46. Possibly and in accordance with another embodiment, an extension of the actual trigger 18 may form directly said hook 18<sup>5</sup>.

The cocking rod 46 is slidingly mounted inside the rocker 23 and its front end or nose 46<sup>2</sup> forms a hook which remains inside the rocker as long as the rod 46 is engaged by the hook on the link 18<sup>2</sup>. A spring 47 housed inside the rocker pushes forwardly a shoulder on said rod 46 so as to make the nose 46<sup>2</sup> on the cocking

rod project when the trigger 18 has pivoted with the link 18<sup>2</sup> at the moment of the firing (Fig. 10) and has released said cocking rod.

The nose 46<sup>2</sup> is adapted to engage the end 48<sup>1</sup> of a bell crank 48 pivotally secured at 48<sup>2</sup> to a fitting of the front section of the gun, which fitting is not illustrated for sake of clarity. The other end 48<sup>3</sup> of the bell crank 48 is adapted to engage a hammer 49 and to hold it in a cocked position in antagonism with the action of a spring 50. The hammer 49 is adapted to impinge against the end of the rod 51 of the ejector, the outer end 51<sup>1</sup> of which engages inside the inside of the barrel chamber so as to extract the cartridge case shown in interrupted lines in Fig. 10 out of the barrel by driving it out through its terminal bead. A spring 52 urges permanently the bell crank 48 into a position for which its end 48<sup>1</sup> is engaged by the edge of the rocker 23.

A cam 53 is also pivotally secured to the same axis 48<sup>2</sup> as the bell crank. Said cam is stopped by an abutment 54 against any downward pivoting movement under the action of its spring 55.

The operation of this arrangement is readily apparent from the above description and from the illustration in Figs. 9 and 10. Fig. 9 shows the automatic ejection means prior to firing. Upon firing the trigger releases the cocking rod the nose 46<sup>2</sup> of which projects beyond the rocker.

When opening the gun, i.e. when pivoting the barrel and the parts carried thereby, the nose 46<sup>2</sup> on the rod 46 engages then the end 48<sup>1</sup> of the bell crank and causes it to rock whereupon the hammer 49 is released and impinges against the ejector rod 51. The cartridge case drawn in interrupted lines in Fig. 10 is thus automatically ejected in the direction of the arrow as soon as the gun is opened. During this time, the cam 53 has been first rocked against the action of its spring so as to release the nose 46<sup>2</sup> after which it returns against the stop 54 under the action of said spring 55.

Upon closing of the gun, the nose 46<sup>2</sup> on the rod 46 engages the cam 53, of which it follows the outline so that it is urged rearwardly with the cocking rod. The latter engages the hook 18<sup>5</sup> on the link 18<sup>2</sup>. The cocking of the hammer or hammers 49 is then obtained for further operation through any conventional means used in mechanical percussion guns.

It will be remarked that the above described automatic ejection mechanism is extremely simple since the special parts required therefor are constituted merely by the cocking rod 46 and its spring, the trigger link 18<sup>2</sup>, the cam 53 and its spring.

The other parts of the mechanism are to be found in an equivalent form in all known ejection mechanisms.

In the mechanism described, the engagement between the nose 46<sup>1</sup> of the cocking rod 46 and the terminal hook 18<sup>5</sup> on the link produces a certain resistance which is readily perceived by the operator when the latter is about to fire. Consequently, it is possible in such a case to dispense with the arrangement of a ball 30 and spring 29 to the rear of the trigger as described hereinabove with reference to Figs. 4 and 5 illustrating the firing circuit.

I have also provided within the scope of the accompanying claims, for the application of the electric firing system and of the associated arrangements to pistols, borers or to the so-called sealing guns which serve in particular for securing nails, bolts and the like missiles in hard materials through an explosive projection similar to that obtained in fire arms.

Obviously and as already apparent from the preceding disclosure, my invention is by no means limited to those applications and embodiments of its different parts which have been more particularly described and it covers all the modifications thereof falling within the scope of the accompanying claims.

What I claim is:

1. In an electric firing system for fire-arms, a member controlling the firing of the fire-arm; a metal mass; a cartridge housed in said metal mass; a cartridge primer within said cartridge; a source of electric current enclosed in said fire-arm; an electric circuit consisting of rigid and stationary members fed by said source of current, said members comprising the mass of the fire-arm and said primer and a rod permanently engaging said primer; a switch in said circuit, said switch comprising stationary contact means and a movable rod-shaped stud adapted to contact directly said contact means and disposed at a right angle to said contact means and substantially at a right angle to the longitudinal axis of the fire-arm, said stud being controlled by the firing controlling member to close and energize the circuit and produce thereby incandescence of the member of the circuit formed by the primer and consequently ignition of the latter.
2. In a gun including a trigger, a metal mass, a cartridge located in said mass, a cartridge case and a primer in said case, the combination of an electric cell having two terminals and enclosed inside the gun, means for connecting one of the terminals of the cell with the mass of the gun, two parallel rigid and stationary plates the first of which is connected with the other terminal of the cell, an insulator permanently separating the two plates, stationary and rigid means electrically connecting permanently the second plate with the cartridge case inside the gun through the primer in the cartridge case, said primer being in contacting relation with the mass of the gun and movable stud-like means located between said parallel plates at a right angle thereto and disposed substantially at a right angle to the longitudinal axis of the gun, said movable means being operated by the trigger of the gun for closing upon operation of the trigger the circuit between the two plates and producing thereby ignition of the primer.
3. In a gun including a trigger, a metal mass, a cartridge located in said metal mass, a cartridge case and a primer in said case, the combination of an electric cell having two terminals and enclosed inside the gun, first means for connecting one of the terminals of the cell with the mass of the gun, two parallel rigid and stationary plates the first of which is connected with the other terminal of the cell, an insulator separating permanently the two plates, second means electrically connecting rigidly and permanently the second plate with the cartridge case inside the gun and through the primer in the cartridge case with the mass of the gun, said first and second means being stationary, an insulated rod-shaped push member movable between and at a right angle to said two plates and controlled by the trigger of the gun and disposed substantially at a right angle to the longitudinal axis of the gun to close the circuit between the two plates and thereby ignite the primer, and a spring urging said push member back into its inoperative position to open said circuit.
4. In a gun including two sections forming metal masses insulated with reference to each other, a cartridge housed in one of said sections, a cartridge case, a primer in said cartridge, the combination of an electric cell having two terminals and enclosed inside the gun, first means for connecting rigidly and permanently one of the terminals of the cell with the housing of the cartridge case inside the corresponding metal section and through the primer in the cartridge with said section, second means electrically connecting the other metal section of the gun with the other terminal of the cell, said first and second means being stationary, a switch including two cooperating parts carried respectively by the two metal sections of the gun mass and a contact-making rod, and third means for closing said switch by translation of said rod at a right angle to said cooperating parts and substantially at a right angle to the longitudinal axis of the gun for



direct contact with said two cooperating parts to cause current to pass through the primer and to ignite same.

5. In a gun including a trigger, a metal mass, a cartridge located in said metal mass, a cartridge case and a primer in said case, the combination of an electric cell having two terminals and enclosed inside the gun, first means for connecting one of the terminals of the cell with the mass of the gun, two parallel rigid and immovable plates, a spring-urged conductive ball engaging the first plate, second means connecting said spring-urged ball with the other terminal of the cell, said first and second means being stationary, an insulator separating permanently the two plates, third means electrically connecting rigidly and permanently the second plate with the location of the cartridge case inside the gun and through the primer in the cartridge case with the mass of the gun, and fourth means comprising a contact-making rod located between said two plates at a right angle thereto and disposed substantially at a right angle to the longitudinal axis of the gun and operated by the trigger of the gun for closing upon operation of said trigger the circuit between the two plates and producing thereby ignition of the primer.

6. In a gun including a trigger, a metal mass, a cartridge located in said metal mass, a cartridge case and a primer in said case, the combination of an electric cell having two terminals and enclosed inside the gun, first means for connecting rigidly one of the terminals of the cell with the mass of the gun, two parallel rigid and stationary plates, the first of which is connected with the other terminal of the cell, an insulator separating permanently the two plates, second means electrically connecting rigidly and permanently the second plate with the location of the cartridge case inside the gun and through the primer in the cartridge case with the mass of the gun, third means located between said plates and including a contact-making member disposed at a right angle to said plates and substantially at a right angle to the longitudinal axis of the gun, said first and second means being stationary, said third means being operated by the trigger for closing upon operation of the trigger the circuit between the two plates and producing thereby ignition of the primer, a depression in the rear wall of said trigger, a ball engaging the trigger and a spring urging said ball in said depression and against the trigger, when the latter is in inoperative position to slightly oppose operation of said trigger on said third means.

7. A gun comprising a metal mass, a housing for a cartridge in said metal mass, a cartridge fitted in said housing, a cartridge case filled with gunpowder, a cartridge primer, a member controlling the firing of the gun, and a firing system including an electric battery enclosed in the gun and having two terminals, a firing circuit consisting of rigid members and including a first section connecting a first terminal of the battery with the mass of the gun, a conductive rod having an end registering with the housing of the cartridge, said first section and said rod being stationary, and a second section including a rod-like stud member disposed substantially at a right angle to the longitudinal axis of the gun and controlled by the member controlling the firing of the gun and for electrically connecting the conductive rod with the second terminal of the battery for ignition of said cartridge, said primer being constituted by a casing fitted removably with a tight fit inside the cartridge case and having a bottom, a central opening in said bottom, an inflammable filling in the primer casing for igniting the gunpowder in the cartridge case, a central contact-piece in said central opening engaging directly and permanently the end of the conductive rod, insulating means fitted between said contact-piece and the edge of the opening in the bottom of the primer casing, at least one wire connecting said contact-piece with the primer casing through the primer filling, the firing circuit completed by the contact-piece, the wire and the casing of the primer being grounded through the cartridge case and the mass of the gun for

ignition of the primer filling upon operation of the controlling member.

8. In combination with a gun comprising a metal mass, a housing for a cartridge in said metal mass, a cartridge fitted in said housing, a cartridge case filled with gunpowder, a cartridge primer, a member controlling the firing of the gun, and a firing system including an electric battery enclosed in the gun and having two terminals, a firing circuit consisting of solid members and including a first section connecting a first terminal of the battery with the mass of the gun, a conductive rod having an end registering with the housing of the cartridge, said first section and said conductive rod being stationary, and a second section including a rod-like stud member disposed substantially at a right angle to the longitudinal axis of the gun and controlled by the member controlling the firing of the gun to electrically connect the conductive rod with the second terminal of the battery for ignition of said cartridge, said primer being constituted by a casing fitted removably with a tight fit inside the cartridge case and having a bottom, a central opening in said bottom, an inflammable filling in the primer casing for igniting the gunpowder in the cartridge case, a central contact-piece in said central opening engaging directly and permanently the end of the conductive rod, insulating means fitted between said contact-piece and the edge of the opening in the bottom of the primer casing, a sparking gap extending between the contact-piece and the primer casing through and inside the filling therein, the firing circuit completed by the contact-piece, the sparking gap and the casing of the primer being grounded through the cartridge case and the mass of the gun for ignition of the primer filling upon operation of the controlling member.

9. In combination with a gun comprising a metal mass, a housing for a cartridge in said metal mass, a cartridge fitted in said housing, a cartridge case filled with gunpowder, a cartridge primer, a member controlling the firing of the gun, and a firing system including an electric battery enclosed in the gun and having two terminals, a firing circuit consisting of solid parts including a first section connecting a first terminal of the battery with the mass of the gun, a conductive rod having an end registering with the housing of the cartridge, said first section and said conductive rod being stationary, and a second section including a rod-like stud member disposed substantially at a right angle to the longitudinal axis of the gun and controlled by the member controlling the firing of the gun to electrically connect the conductive rod with the second terminal of the battery for ignition of said cartridge, said cartridge case having a bottom, inturned flanges on said bottom and forming a cylindrical housing for said primer, a highly inflammable primer filling inside said housing, an insulating member closing said housing to the rear of said filling, the front of said filling opening directly into the gunpowder filling the cartridge case, a central contact-piece extending through the insulating member into the primer filling, said conductive rod contacting directly and permanently said contact-piece, means for feeding current through the primer filling between the housing and the contact-piece, the firing circuit completed by the contact-piece, the last mentioned current feeding means and the housing of the primer being grounded through the cartridge case and the mass of the gun for ignition of the primer filling upon operation of the controlling member.

10. An electric firing system for fire-arms, including a member controlling the firing of the fire-arm and a metal mass, a cartridge, a housing for said cartridge in said metal mass, a primer incorporated in said housing, an electric cell having two terminals and two rigid leads, each being connected to one of said terminals, said cell being enclosed inside said fire-arm, an electric circuit fed by the cell over said terminals and leads and including rigid sections constituted respectively by the mass of the fire-arm and the primer of the cartridge, a switch in said circuit,

11

said switch comprising an inner rod-shaped contact-making stud disposed substantially at a right angle to the longitudinal axis of the fire-arm and controlled by the firing controlling member to energize the circuit and produce thereby incandescence of the section of the circuit formed by the primer and consequently ignition of the latter, and protective means for said terminals and leads adapted to prevent energization of said circuit during inoperativeness of said fire-arm.

11. In a gun including a trigger and a metal mass provided with a location for a cartridge, a cartridge housed in said location, a primer inside said cartridge and in contacting relation with the mass of the gun, an electric cell having two terminals and enclosed inside the gun, first means for connecting one of the terminals of the cell with the mass of the gun, two parallel rigid and stationary plates the first of which is connected with the other terminal, an insulator separating permanently said two plates, second stationary means rigidly and permanently connecting electrically the second plate with the cartridge case and through the primer with the mass of the gun, said primer being also in contact relationship with said second means, and third means located movably between and at a right angle to said two plates and disposed substantially at a right angle to the longitudinal axis of the gun and operated by the trigger for closing

12

the circuit between said cell, said two plates and said primer, producing thereby the ignition of the primer.

## References Cited in the file of this patent

## UNITED STATES PATENTS

307,070	Russell	Oct. 21, 1884
309,262	Thompson	Dec. 16, 1884
715,903	Torkelson	Dec. 16, 1902
815,490	Thomas	Mar. 20, 1906
1,035,940	Baker	Aug. 20, 1912
1,043,719	Peuble	Nov. 5, 1912
1,239,344	Bowman et al.	Sept. 4, 1917
1,266,573	Fleming	May 21, 1918
1,303,032	Cortner	May 6, 1919
1,450,976	Larson	Apr. 10, 1923
1,875,941	Schwartz	Sept. 6, 1932
2,466,929	Catlin et al.	Apr. 12, 1949
2,553,995	Young	May 22, 1951
2,659,994	Yale	Nov. 24, 1953
2,805,604	Humphrey	Sept. 10, 1957

## FOREIGN PATENTS

519,341	Great Britain	Mar. 21, 1940
500,721	Italy	Nov. 20, 1954
1,118,253	France	Mar. 12, 1956