

No. 839,124.

PATENTED DEC. 25, 1906.

W. H. DRIGGS.
FIRING MECHANISM FOR GUNS.

APPLICATION FILED APR. 23, 1906.

3 SHEETS—SHEET 1.

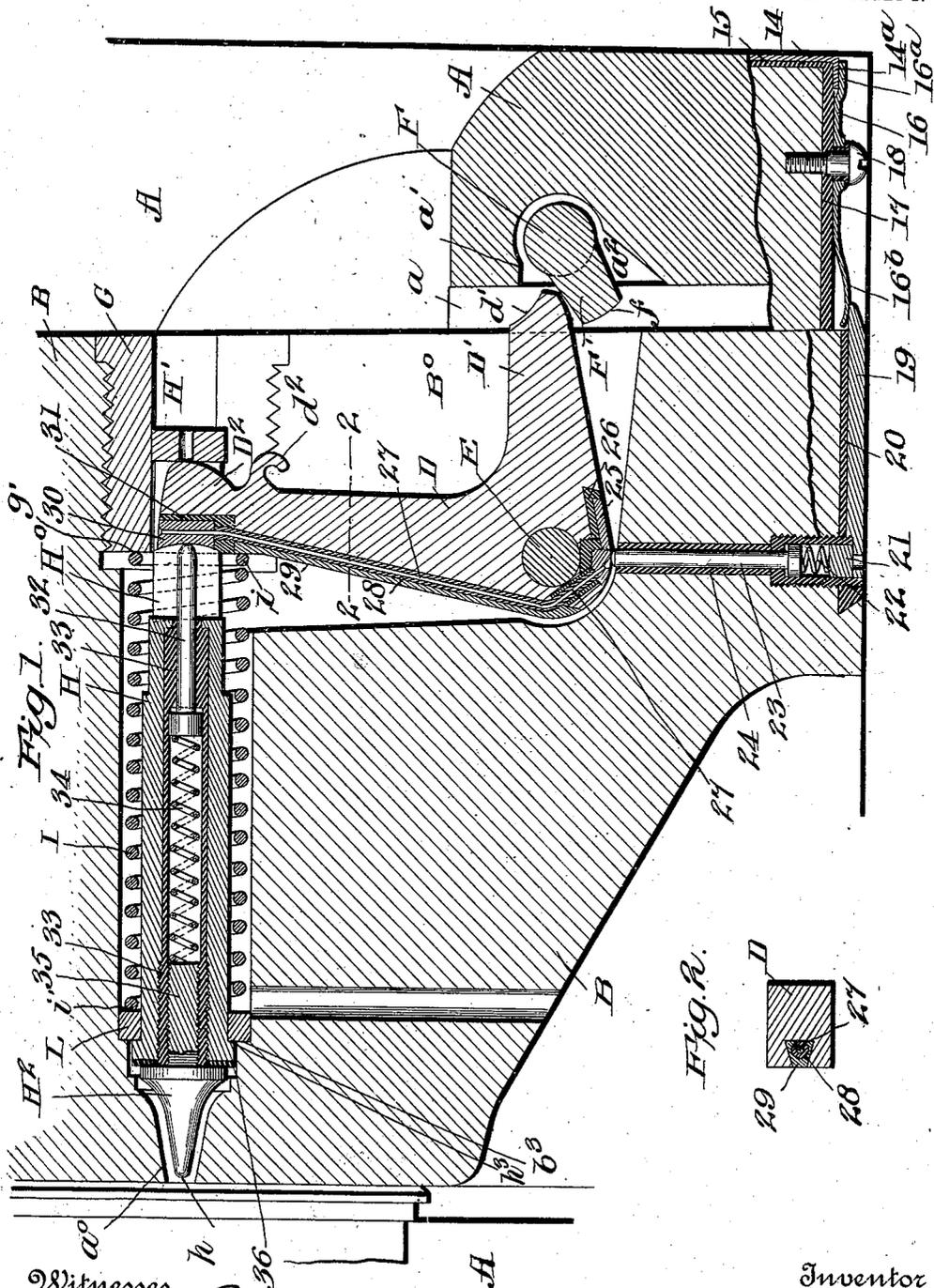


FIG. 1.

FIG. 2.

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3 SHEETS—SHEET 3.

Fig. 6.

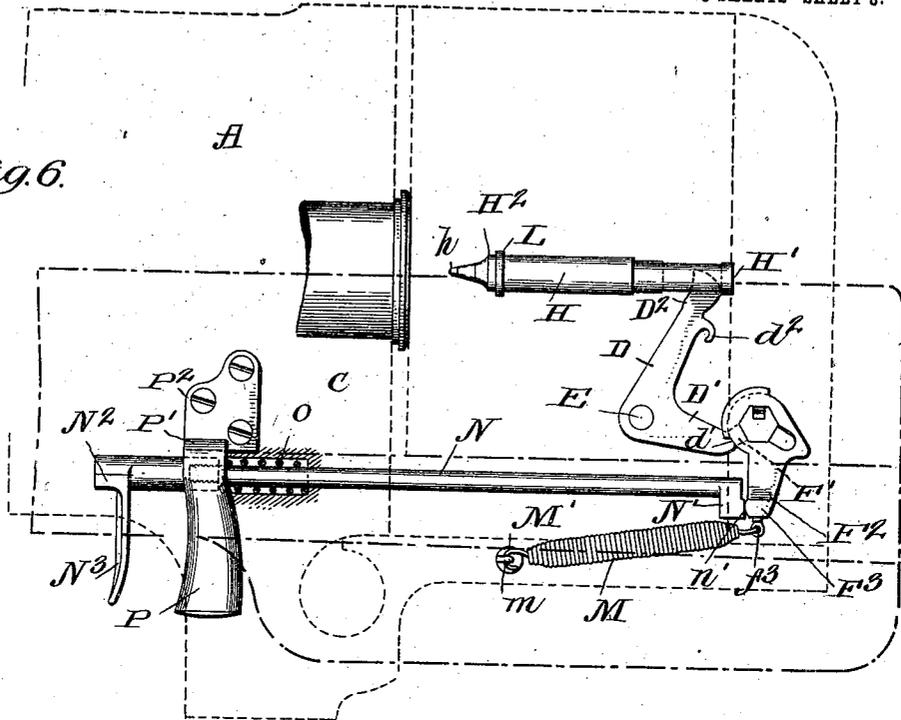


Fig. 7.

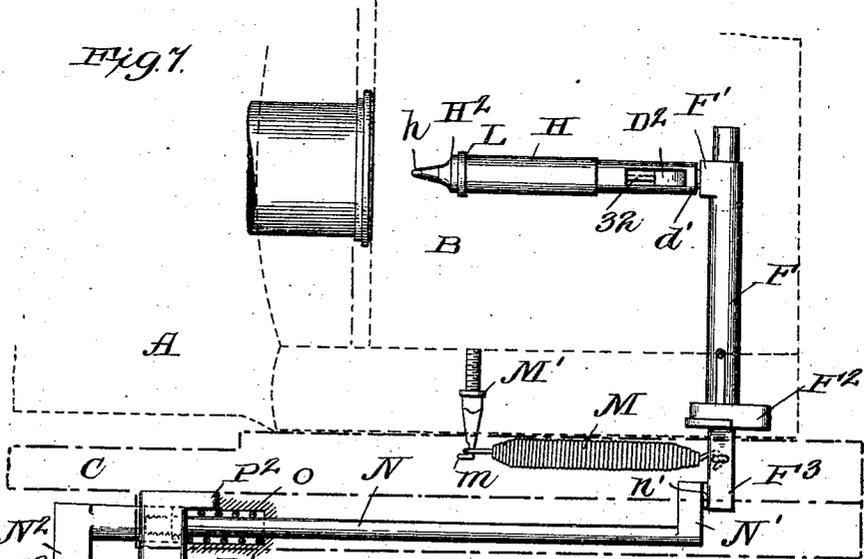
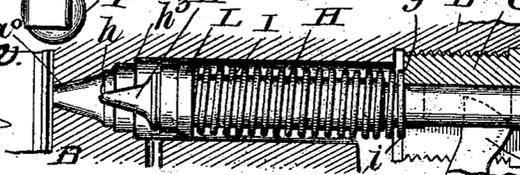


Fig. 8.



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FIRING MECHANISM FOR GUNS.

No. 839,124.

Specification of Letters Patent.

Patented Dec. 25, 1906.

Application filed April 23, 1906. Serial No. 313,265.

To all whom it may concern:

Be it known that I, WILLIAM HALE DRIGGS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Firing Mechanism for Guns; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to improvements in firing apparatus for guns; and it consists more especially in improvements in apparatus for firing a gun either by percussion or by electricity, as may be preferred, using substantially the same principal parts with such additions as may be necessary.

My invention will be understood by reference to the accompanying drawings, in which the same parts are indicated by the same letters and numerals throughout the several views.

Figure 1 shows a vertical longitudinal section through a breech-block of the wedge type, showing the adjacent parts of the gun. This section is taken along the broken line 1 1 of Fig. 3 and looking in the direction of the arrows. Figure 2 shows a section along the line 2 2 of Fig. 1 and looking down. Fig. 3 is a rear view of the gun, partly in section, along the broken line 3 3 of Fig. 4 and looking in the direction of the arrows. Fig. 4 shows a section along the line 4 4 of Fig. 3 and looking in the direction of the arrows. Fig. 5 shows a section along the line 5 5 of Fig. 3. Fig. 6 shows in side elevation the firing mechanism in the cocked position. The gun and slide are shown in dotted lines and parts are omitted for the sake of clearness in the drawings. Fig. 7 is a plan view of the firing mechanism shown in Fig. 6; and Fig. 8 is a detail showing the firing-pin in the cocked position.

For convenience of reference the purely mechanical parts will be designated by letters and the electrical connections and insulating material will be indicated by numerals.

A represents the gun-body, B the breech-block, and C an arm attached to the rocking slide or cradle of the gun. This arm C is provided with overhanging flanges C², adapted to receive the ribs A² on the guide-lugs A'

at each side of the gun. The gun recoils in the cradle, as is well known in the art.

D represents the cocking-lever, which is made in the form of a bell-crank pivoted on the pin E. This lever has a cocking-arm D' and a head D², which head engages in a slot in the firing-pin, as will be hereinafter described. The cocking-arm D' is provided with a cocking-toe d', which engages the arm F' on the sear F. When the gun is cocked, the face f of this arm F' engages the toe d', as shown in Fig. 6, but after the gun has been fired these parts are in the position shown in Fig. 1. The breech of the gun is provided with a vertical slot a for the cocking-toe to travel up and down in as the block is raised or lowered and with a shoulder a' to arrest the upward rotation of the arm F' and with a recess a² to allow the said arm F' to be pressed down far enough to allow the toe d' to pass as the breech-block is lowered in opening the breech. The cocking-arm F' is normally held in engagement with the shoulder a' by means of the spring M, (see Fig. 6,) and the mechanical operation of the firing mechanism will be hereinafter described.

The head D² of the cocking-lever D engages in the slot H⁰ in the firing-pin H. The rear wall of said slot is shown at H' in Fig. 1. This firing-pin H carries an insulated head H², terminating in the pin-point h. This firing-pin is shouldered, as at h³, to engage the ring L, (see Fig. 1,) and the breech-block is correspondingly shouldered, as at b³, to limit the forward travel of this ring in the block for purposes to be hereinafter described.

I represents the firing-spring, whose rear end i normally presses the head D² back against the part H' of the firing-pin, while the front end of this spring i' presses against the ring L, as shown in Fig. 1. The spring is normally held under compression between the face g' of the bushing G and the ring L. (See Fig. 1.)

The sear F carries an arm F² with a lateral extension F³, to which is connected one end of the spring M. The other end of the spring engages the hook m of the pin M', secured to the gun. Thus the tendency of this spring M is to rock the sear, tending to cause the arm F' to engage the shoulder a', (see Fig. 1,) but permitting the said arm to be pressed down-

ward by the cocking-toe d' , as the breech-block descends. This spring also causes the extension F^3 on the arm F^2 to engage the lug n' on the rod N' fast to or integral with the rod N , which rod carries at its forward end an arm N^2 beneath which projects the trigger N^3 just in front of the pistol grip P , which is carried by the arm P' integral with the plate P^2 , fast to the arm C , secured to the cradle of the gun. By pulling on this trigger N^3 the rod N will be slid backward, rocking the sear F against the action of the spring M and causing the face f of the cocking-arm F' to pass clear of the cocking-toe d' . This will release the cocking-lever, and the spring I will drive the firing-pin forward, firing the gun, as will be hereinafter described. The trigger-rod is normally pressed forward by a spring O .

The electrical connections are as follows: The current comes in the positive wire 1 (shown to the left of Fig. 3) and enters the binding-post 2 beneath the binding-screw 2^a . This binding-post is insulated from the arm C by means of the insulating-bushing 3. From the binding-post 2 the current enters the conducting-plug 4 in the insulating-bushing 5, and thence passes to the conducting-plunger 6, pressed forward by the spring 7, and thence passes to the conducting-plug 10. This plunger, plug, and spring are insulated, as at 8 and 9. From the plug 10 the current passes to the conductor 11, insulated, as at 12, and thence to the screw 13, having a milled head 13^a , and this screw passes through the insulating material 15 and connects the conductor 11 with the conducting-strip 14. This strip 14, with the conducting material 15, is dovetailed into the rear face of the breech of the gun, as shown in Fig. 5, and its outer face is flush with the face of the gun and is thus protected against likelihood of injury from careless operation of the gun or from small projectiles. From the strip 14 the current passes to the spring 16, which is held in place by the insulated screw 18 and is itself insulated, as at 17. The arm 16^a of this spring presses against the conducting-strip 14, and the opposite arm 16^b presses against the conducting-piece 19, which is insulated, as at 20, and is connected to the conducting-block 21 below the spring 22, which presses upward the conducting-plunger 23. This plunger, spring, and block are insulated, as at 24. The plunger 23 contacts with the conducting-piece 25, insulated, as at 26, and this piece 25 is connected to the wire 27, insulated, as at 28. This wire 27 and its insulating-covering 28 are preferably mounted in a dovetailed groove in the front of the lever D , which groove is then filled in with amalgam 29, (see Fig. 2,) and thus this wire is held firmly in place without likelihood of injury from ordinary causes. The upper end of this wire 27 is connected to a conducting-block 30, mounted in insulating material 31, car-

ried by the head D^2 of the lever D . The current is carried from this block 30 to the plunger 32, which is mounted in the cylinder 33, of insulating material, in front of the spring 34. This spring 34 presses the plunger 32 in contact with the block 31, and the opposite end of the spring presses against the conducting-plug 35, which is secured in the end of the insulating-cylinder 33, which latter cylinder is mounted in the firing-pin H . The head of the firing-pin H^2 is connected to the conducting-plug 35, as is also the firing-point h . The head H^2 of the firing-pin projects into a chamber a^0 in the nose of the breech-block, as shown in Fig. 1, and is separated from the walls of said chamber by an air-space and has at its base an insulating-washer 36.

The operation of the device is as follows: Suppose it be desired to fire mechanically. The block is shown in Fig. 1 in the closed position with the firing mechanism in the position assumed after the gun has been fired. In the operation of opening the breech for reloading the toe d' will slide down the slot a , pressing back the arm F' against the action of the coil-spring M , and as soon as this toe passes this arm the arm F' snaps back to the position engaging the shoulder a' . The spring I will maintain the lever D and the firing-pin in the position shown in Fig. 1 so long as the breech-block is down. When the breech-block is raised again, the toe d' will strike the arm F' , and since the latter bears against the shoulder a' the further upward movement of the breech-block will cock the firing mechanism, causing the face f to engage the toe d' . When the mechanism is cocked, the ring L will be drawn back, compressing the spring I , as shown in Fig. 8. Now if the arm F' is released from engagement with the toe d' , as by pulling on the trigger N^3 , the spring I will force the ring L forward, carrying with it the firing-pin and the head of the sear, and this ring will continue its forward travel until it abuts against the shoulder b^3 of the breech-block. At this time the ring L will be arrested; but the inertia of the firing-pin will cause the point h to fly farther forward, striking the primer and exploding the charge. The reaction of the spring on the sear-head will immediately return the firing-pin to the initial position, (shown in Fig. 1,) thus drawing the point h back clear of the nose of the breech-block and preventing any injury to the same as the breech-block is raised or lowered and also drawing same clear of the primer. To fire electrically, the gun is automatically cocked by the closing of the breech-block, as already described with reference to the mechanical operation, or it may be cocked by hand by pulling the head D^2 of the lever D back with a hook or an eye engaging in the hook d^2 until the toe d' passes clear of the arm F' , when

the face *f* will snap back to the cocked position, and when the cocking-lever is released the spring *I* will cause the toe *d'* to engage the face *f*. During the period of electric firing one pole of the source of electricity is maintained in electrical connection with the wire 1, and the other pole is connected to some part of the gun-mount in the usual way. The circuit is completed from the wire 1 through the conductors 2, 4, 6, 10, 11, 13, 14, 16, 19, 21, 22, 23, 25, 27, 30, 32, 34, and 35 to the point *h*. There is a break here which is closed when the trigger is pulled, and the firing-pin flies forward under the action of the spring *I*, causing the point *h* to strike the primer and complete the circuit. Thus the same firing mechanism may be used absolutely without change to fire either by percussion or by electricity, and where combination primers are used, which are fired either by percussion or electricity, one or the other of the agencies will accomplish the desired result.

It will be obvious that the percussion apparatus may be used with the ordinary percussion-primer and the electric apparatus with the ordinary electric primer, while the apparatus is especially adapted for use with combination primers of the character just referred to.

By having the conductors 14, 19, 25, and 27, with their insulating material, inlaid in the face of the corresponding parts these conductors are not apt to be injured or affected in the ordinary handling of the gun or even should the gun be struck by small projectiles, and they are not likely to get in the way in the operation of the gun, as happens where loose wires are used or where wires are attached to the parts of the gun and mount exterior to the surface thereof.

By having spring-plungers used in connection with the various contacts a good electric contact is secured, which is especially desirable at points where there is apt to be a film of grease or water or other non-conducting material.

It will be obvious that various modifications might be made in the herein-described apparatus which could be used without departing from the spirit of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent of the United States, is—

1. A combined percussion and electric firing mechanism for use with guns having reciprocating breech mechanism comprising a firing-pin, slotted in its rear end and provided with a collar near its forward end, the said collar being adapted to engage a shoulder on the breech-block before the pin strikes the primer, a coil-spring mounted under compression on said firing-pin and held between said collar and a shoulder on the breech-block toward the rear of said pin, a bell-crank cocking-

lever having an arm projecting into said slot in the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, an arm on said sear, a spring connected to said arm and normally rocking said sear to the initial position, a sliding rod normally held in engagement with said arm, and a trigger carried by said rod whereby said rod may be drawn backward rocking said sear against the action of said spring, with electrical connections carried by the gun, the cocking-lever and the firing-pin, whereby the circuit may be closed when the firing-pin strikes the primer, substantially as described.

2. A combined percussion and electric firing mechanism for use with guns having reciprocating breech mechanism comprising a firing-pin, slotted in its rear end and provided with a collar near its forward end, the said collar being adapted to engage a shoulder on the breech-block before the pin strikes the primer, a coil-spring mounted under compression on said firing-pin and held between said collar and a shoulder on the breech-block toward the rear of said pin, a bell-crank cocking-lever having an arm projecting into said slot in the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, an arm on said sear, a spring connected to said arm and normally rocking said sear to the initial position, a sliding rod normally held in engagement with said arm, and a trigger carried by said rod, whereby said rod may be drawn backward rocking said sear against the action of said spring, the said firing-pin being provided with a conducting-head insulated from the body of the pin and from the gun, electrical conductors within said firing-pin but insulated therefrom, electrical conductors inlaid in the face of the cocking-lever and insulated therefrom, and electrical conductors from the conductor inlaid in the cocking-lever to the source of electricity, whereby the circuit is closed when the firing-pin strikes the primer, substantially as described.

3. A combined percussion and electric firing mechanism for use with guns having reciprocating breech mechanism comprising a firing-pin slotted in its rear end and provided with a collar near its forward end, the said collar being adapted to engage a shoulder on the breech-block before the pin strikes the primer, a coil-spring mounted under compression on said firing-pin and held between said collar and a shoulder on the breech-block toward the rear of said pin, a bell-crank cocking-lever having an arm projecting into said slot in the firing-pin and provided with a cocking-toe projecting into a slot in the wall

of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, an arm on said sear, a spring connected to said arm and normally rocking said sear to the initial position, a sliding rod normally held in engagement with said arm, and a trigger carried by said rod whereby said rod may be drawn backward rocking said sear against the action of said spring, the said firing-pin being provided with a conducting-head insulated from the body of the pin and from the gun, electrical conductors within said firing-pin but insulated therefrom, electrical conductors inlaid in the face of the cocking-lever and insulated therefrom, and electrical conductors contained in but insulated from the gun-body, with electrical conductors carried by an arm on the cradle and making electrical connections with the conductors carried by the gun when the gun is in the initial or run-out position, thus leaving the only break in the circuit, that between the point of the firing-pin and the primer, which break is closed when the firing-pin flies forward under the action of its spring, substantially as described.

4. A combined percussion and electric firing mechanism comprising a firing-pin, provided with a collar near its forward end, the said collar being adapted to engage a shoulder on the breech-block before the pin strikes the primer, a coil-spring mounted under compression on said firing-pin and held between said collar and a shoulder on the breech-block toward the rear of said pin, a bell-crank lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, a spring normally rocking said sear to the initial position, and a trigger with mechanism controlled thereby for rocking said sear against the action of said spring, with electrical conductors carried in part by said cocking-lever and the firing-pin, whereby the circuit may be closed when the firing-pin strikes the primer, substantially as described.

5. A combined percussion and electric firing mechanism, comprising a firing-pin, a coil-spring mounted under compression in said pin and adapted to impel said pin forward to the firing position and to retract the pin-point slightly after firing, a cocking-lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, a spring normally rocking said sear to the initial position, and a trigger with mechanism controlled thereby for rocking said sear against the action of said spring, with electrical conductors carried in part by said cocking-lever and the firing-pin, whereby the

circuit may be closed when the firing-pin strikes the primer, substantially as described.

6. A combined percussion and electric firing mechanism comprising a firing-pin, a coil-spring mounted under compression on said pin and adapted to impel said pin forward to the firing position and to retract the pin slightly after firing, a cocking-lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, an arm on said sear, a spring connected to said arm and normally rocking said sear to the initial position, a sliding rod normally held in engagement with said arm, and a trigger carried by said rod whereby said rod may be drawn backward rocking said sear against the action of said spring, with electrical connections carried by the gun, the cocking-lever and the firing-pin, whereby the circuit may be closed when the firing-pin strikes the primer, substantially as described.

7. A combined percussion and electric firing mechanism comprising a firing-pin, provided with a collar near its forward end, the said collar being adapted to engage a shoulder on the breech-block before the pin strikes the primer a coil-spring mounted under compression on said firing-pin and held between said collar and a shoulder on the breech-block toward the rear of said pin, a bell-crank cocking-lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, a spring normally rocking said sear to the initial position, and a trigger with mechanism controlled thereby for rocking said sear against the action of said spring, the said firing-pin being provided with a conducting-head insulated from the body of the pin and from the gun, electrical conductors within said firing-pin but insulated therefrom, electrical conductors secured to the cocking-lever and insulated therefrom, and electrical conductors from the latter to the source of electricity, whereby the circuit is closed when the firing-pin strikes the primer, substantially as described.

8. A combined percussion and electric firing mechanism comprising a firing-pin, a coil-spring mounted under compression in said pin and adapted to impel said pin forward to the firing position and to retract the pin-point slightly after firing, a cocking-lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, a spring normally rocking said sear to the initial position, and a trigger with mech-

anism controlled thereby for rocking said sear against the action of said spring, the said firing-pin being provided with a conducting-head insulated from the body of the pin and from the gun, electrical conductors within said firing-pin but insulated therefrom; electrical conductors secured to the cocking-lever and insulated therefrom, and electrical conductors from the latter to the source of electricity, whereby the circuit is closed when the firing-pin strikes the primer, substantially as described.

9. A combined percussion and electric firing mechanism comprising a firing-pin, a coil-spring mounted under compression in said pin and adapted to impel said pin forward to the firing position and to retract the pin-point slightly after firing, a cocking-lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, an arm on said sear, a spring connected to said arm and normally rocking said sear to the initial position, a sliding rod normally held in engagement with said arm, and a trigger carried by said rod whereby said rod may be drawn backward rocking said sear against the action of said spring, the said firing-pin being provided with a conducting-head insulated from the body of the pin and from the gun, electrical conductors within said firing-pin but insulated therefrom, electrical conductors secured to the cocking-lever and insulated therefrom, and electrical conductors from the latter to the source of electricity, whereby the circuit is closed when the firing-pin strikes the primer, substantially as described.

10. A combined percussion and electric firing mechanism comprising a firing-pin, provided with a collar near its forward end, the said collar being adapted to engage a shoulder on the breech-block before the pin strikes the primer, a coil-spring mounted under compression on said firing-pin and held between said collar and a shoulder on the breech-block toward the rear of said pin, a bell-crank cocking-lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, a spring normally rocking said sear to the initial position, and a trigger with mechanism controlled thereby for rocking said sear against the action of said spring, the said firing-pin being provided with a conducting-head insulated from the body of the pin and from the gun, electrical conductors carried by said firing-pin and connected to said head but insulated from the body of the pin, electrical conductors secured to the cocking-lever and insulated

therefrom, and electrical conductors contained in but insulated from the gun-body, with electrical conductors carried by an arm on the cradle and making electrical connections with the conductors carried by the gun when the gun is in the initial or run-out position, thus leaving the only break in the circuit, that between the point of the firing-pin and the primer, which break is closed when the firing-pin flies forward under the action of its spring, substantially as described.

11. A combined percussion and electric firing mechanism comprising a firing-pin, a coil-spring mounted under compression in said pin and adapted to impel said pin forward to the firing position and to retract the pin-points slightly after firing, a cocking-lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, a spring normally rocking said sear to the initial position, and a trigger with mechanism controlled thereby for rocking said sear against the action of said spring, the said firing-pin being provided with a conducting-head insulated from the body of the pin and from the gun, electrical conductors carried by said firing-pin and connected to said head but insulated from the body of the pin, electrical conductors secured to the cocking-lever and insulated therefrom, and electrical conductors contained in but insulated from the gun-body, with electrical conductors carried by an arm on the cradle and making electrical connections with the conductors carried by the gun when the gun is in the initial or run-out position, thus leaving the only break in the circuit, that between the point of the firing-pin and the primer, which break is closed when the firing-pin flies forward under the action of its spring, substantially as described.

12. A combined percussion and electric firing mechanism comprising a firing-pin, a coil-spring mounted under compression in said pin and adapted to impel said pin forward to the firing position and to retract the pin-point slightly after firing, a cocking-lever having an arm engaging the firing-pin and provided with a cocking-toe projecting into a slot in the wall of the gun, a sear pivoted in the gun and provided with a cocking-toe adapted to engage the toe of the cocking-lever, an arm on said sear, a spring connected to said arm and normally rocking said sear to the initial position, a sliding rod normally held in engagement with said arm, and a trigger carried by said rod whereby said rod may be drawn backward rocking said sear against the action of said spring, the said firing-pin being provided with a conducting-head insulated from the body of the pin and from the gun, electrical conductors carried by said

firing-pin and connected to said head but insulated from the body of the pin, electrical conductors secured to the cocking-lever and insulated therefrom, and electrical conductors contained in but insulated from the gun-body, with electrical conductors carried by an arm on the cradle and making electrical connections with the conductors carried by the gun when the gun is in the initial or run-out position, thus leaving the only break in the circuit, that between the point of the fir-

ing-pin and the primer, which break is closed when the firing-pin flies forward under the action of the spring, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM HALE DRIGGS.

Witnesses:

A. L. HOUGH,

W. MAX. DUVALL.