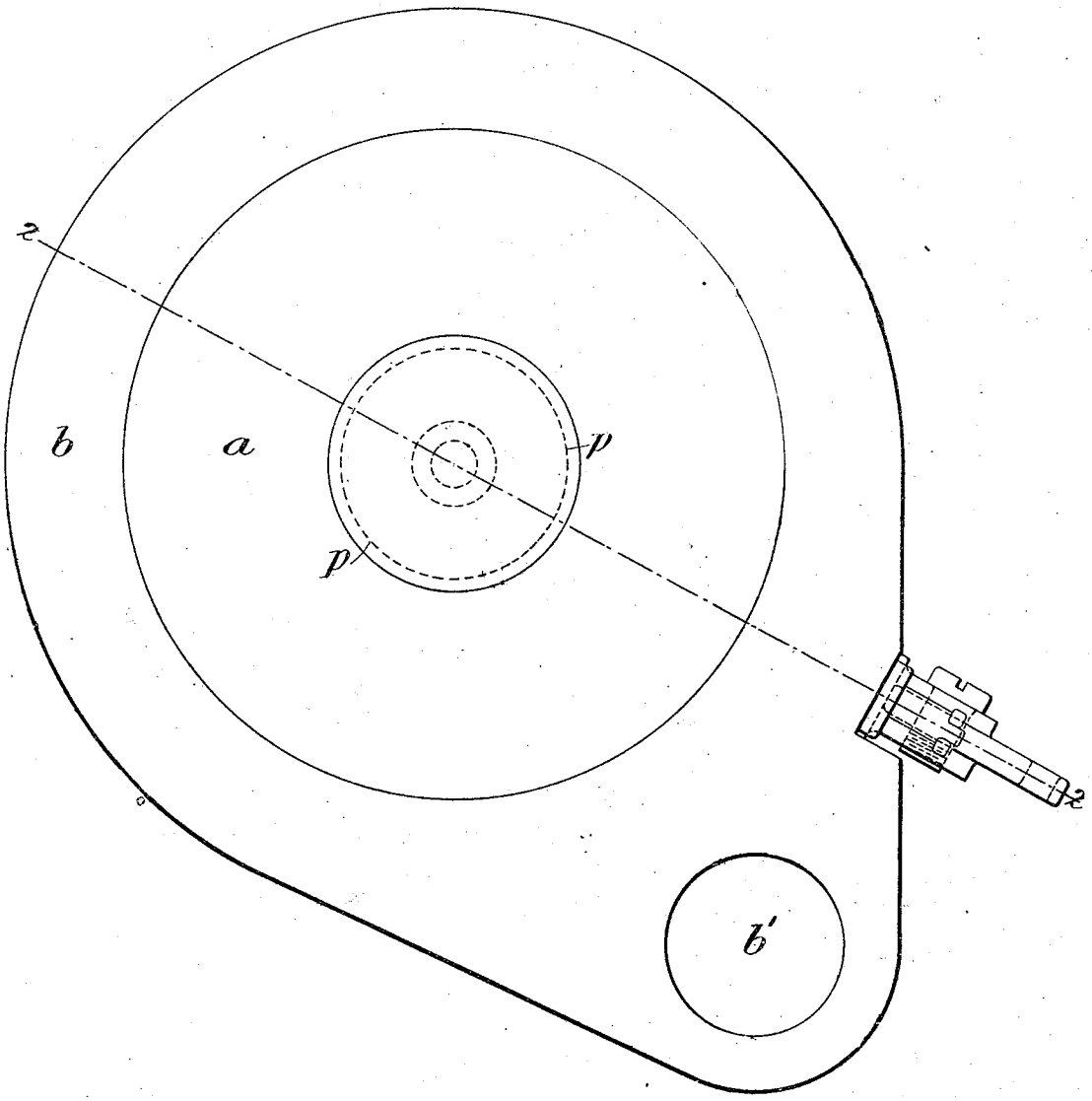
(No Model.) 2 Sheets—Sheet 1.

T. NORDENFELT.

ELECTRIC FIRING MECHANISM FOR BREECH LOADING GUNS.

No. 411,831. Patented Oct. 1 1889.

Fig. 1.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

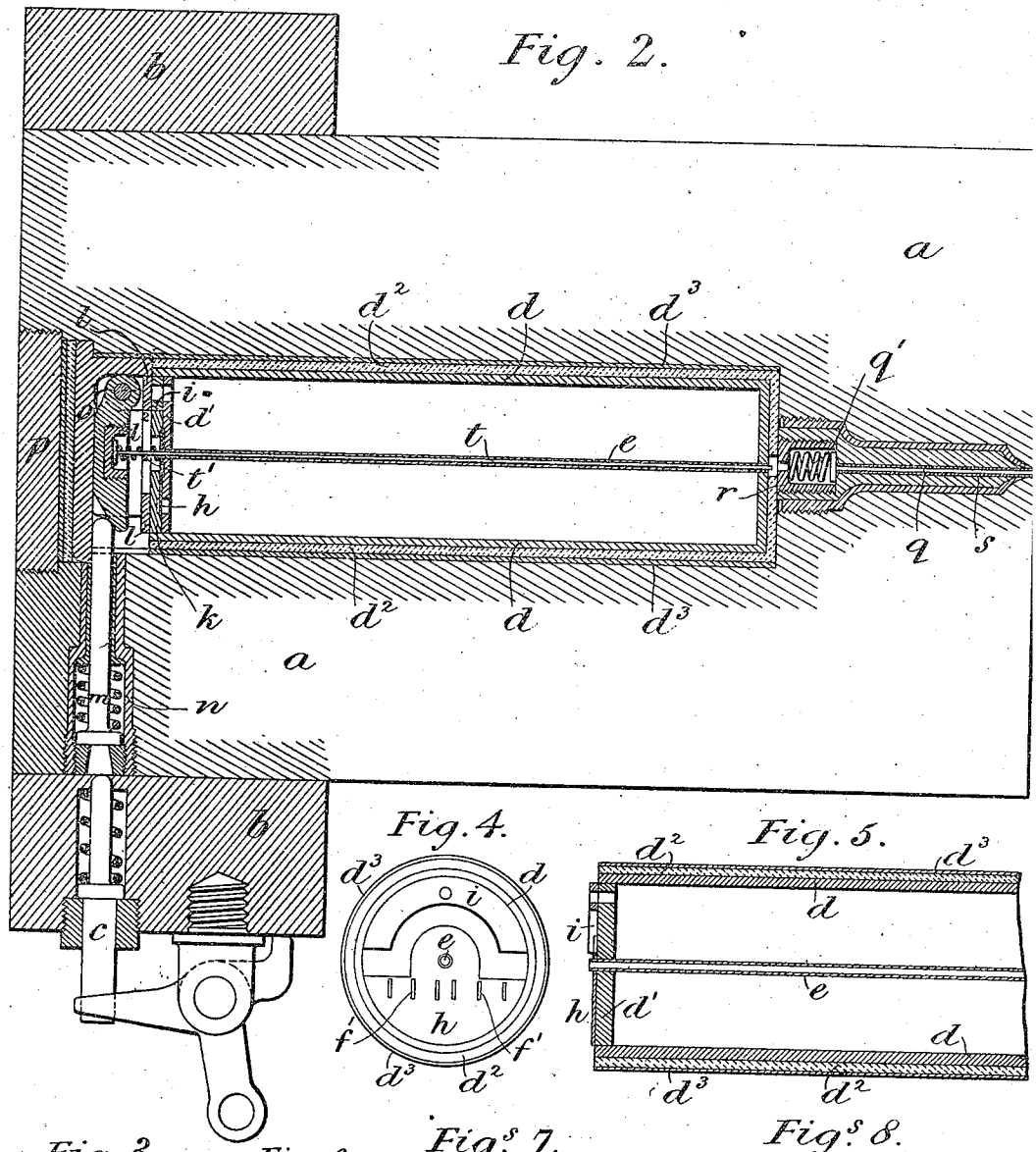


Fig. 4.

Fig. 5.

Fig. 3.

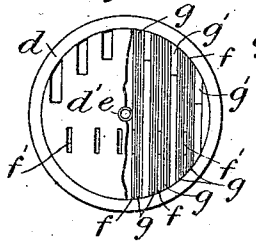


Fig. 6.

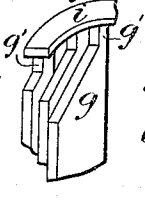


Fig. 7.

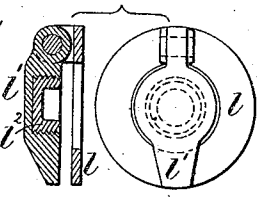
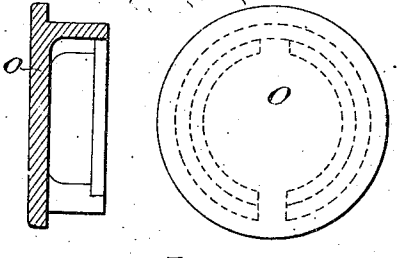


Fig. 8.



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UNITED STATES PATENT OFFICE.

THORSTEN NORDENFELT, OF WESTMINSTER, ENGLAND, ASSIGNOR TO THE MAXIM-NORDENFELT GUNS AND AMMUNITION COMPANY, (LIMITED,) OF SAME PLACE.

ELECTRIC FIRING MECHANISM FOR BREECH-LOADING GUNS.

SPECIFICATION forming part of Letters Patent No. 411,831, dated October 1, 1889.

Application filed April 24, 1889. Serial No. 308,354. (No model.)

To all whom it may concern:

Be it known that I, THORSTEN NORDENFELT, civil engineer, a subject of the King of Sweden, residing at 53 Parliament Street, in the city of Westminster, England, have invented certain new and useful Improvements in Electric Firing Mechanism for Breech-Loading Guns, of which the following is a specification.

In the specifications of former patents applied for by me—Nos. 384,537 and 388,576—I described breech-loading mechanism in which the breech-block was formed with a divided screw-thread, so that it could be released by a partial turn and be then drawn back into a ring and be carried in this ring to one side of the gun, the ring then turning on an axis parallel with the bore. I now form such guns with electric firing mechanism in the following manner: The breech-block is formed with a cavity extending into it centrally from its rear end. Into this cavity an electric battery is inserted, which, with insulating material surrounding it, just fits the cavity. The rear end of the cavity is closed by a screw-plug. From the front end of the cavity a contact-rod extends and protrudes slightly from the front face of the block. Preferably the rod is pressed forward by a spring, which also serves as a conductor between the rod and a metal disk at the front end of the casing of the battery, which either permanently or preferably only at the instant of firing is placed in electrical connection with one pole of the battery. In this way one pole of the battery is brought into contact with the ordinary insulated central stem of the electric fuse at the center of the base of the cartridge when the gun is loaded. The other pole of the battery is in connection with a metallic ring at the exterior of the rear end of the battery-casing, and which is insulated from the metal disk at the front end of the casing. A contact-rod passes radially through the breech-block and is normally held away from the ring forming the battery-terminal by a spring. The ring into which the rear end of the breech-block extends also has passing radially through it a contact-rod, the inner end of which comes opposite to the outer end of the contact-rod in the breech-block when the breech-block is closing the rear end of the gun. The rod carried by the ring is normally held back by a spring from coming into contact with the rod carried by the block. It is also in electrical contact with the ring, and so with the metal of the gun.

When the gun is loaded, it can be fired by pressing inward the rod carried by the ring and causing it to press inward the rod carried by the block and bring the inner end of this rod into contact with the ring at the rear end of the battery, which forms the battery-terminal. A circuit will then be completed from one pole of the battery to the other through the fuse in the cartridge, and the cartridge will be fired. The pressing inward of the contact-rod carried by the ring may be effected by a lever acted on by a cord, or may be effected in other convenient way. If, as is preferred, the disk at the front end of the casing of the battery is not permanently connected electrically with the battery, then the contact-rod, as it moves forward, is made to establish this connection by thrusting forward a needle, which is insulated from the contact-rod, but permanently connected with the battery-pole.

The breech-blocks of breech-loading guns of other construction than those described in my former applications for patents may also be formed with a cavity within them to receive the electric battery used for electric ignition of the cartridges.

In order that my said invention may be fully understood and readily carried into effect, I will proceed to describe the drawings hereunto annexed.

In the drawings, Figure 1 is a rear elevation of the breech-block and carrying-ring. Fig. 2 is a longitudinal section of the same on the line 2 2 in Fig. 1. Figs. 3 to 8 show some of the parts separately.

a is the breech-block, which is adapted to the breech of the gun by a divided screw-thread on its exterior; but this, as it forms no part of the present invention, is not represented in the drawings.

b is the ring in which the breech-block is carried when it is withdrawn. This ring can

turn for part of a revolution around the stud-axis b', which is fixed into the breech end of the gun. The ring b carries the contact-rod c, which to fire the gun is thrust inward by pulling a lanyard or in other convenient way. In the breech-block there is a central cylindrical cavity, and in this cavity the battery-cell is contained. The case consists of an ebonite cylinder d, closed by a cover d' of the same material and enveloped in soft india-rubber d^2, and over this there is a jacket of vulcanized fiber d^3, to prevent chafing of the india-rubber when the casing is thrust into the cavity in the breech-block. A silver tube e extends from end to end of the casing. The casing contains, preferably, silver and zinc plates, together with chloride of silver and chloride of ammonium in solution, or in place of the latter caustic potash may be employed. The silver plates are covered with precipitated chloride of silver, which is attached to the plate by partial fusion, and the plate is then enveloped in a bag of linen or parchment-paper. Each silver plate is coated with chloride on both its faces, except that at the center of the cell there are two silver plates, one on either side of the tube c, and these are coated on one side only.

Fig. 4 is an end elevation of the battery-cell, and Fig. 5 is a section.

The silver plates are marked $f\,f$ and the zincs which lie on either side of them are marked $g\,g$. Each silver plate has a tail f', which projects through a slit in the cover d'. It also passes through a slit in a silver plate h, which lies against the outer face of the cover, and it is attached to this plate by solder. The zinc plates g are also provided with projections or tails g', and by these they are attached to the bar i.

The parts g, g', and i are shown in perspective by Fig. 6. The tails g' are received into notches in the cover of the casing d.

Between the zincs and the coated silver plates several thicknesses of blotting-paper are placed, and also in each case a thin sheet of finely-perforated celluloid. When the plates are all in place, the joints around the cover d' are made tight by an insulating-cement.

When required for use, the battery-cell is filled through a hole in the cover with a saturated solution of sal-ammoniac, and the hole is then plugged. In place of sal-ammoniac a solution of caustic potash may be used, as already stated. The cell, it will be seen, contains little or no free liquid; but the liquid is held in the pores of the absorbent material.

Over the silver plate h a covering k, of vulcanized fiber, is placed, and this forms a flat surface against which ring l rests. This ring is shown separately by Fig. 7. This ring also rests upon the bar i, and so is always in electrical connection with the zincs of the battery-cell. The ring l, I prefer to provide with a movable part or flap l', jointed to it, and it is with this that the contact-pin m in the breech-block makes contact in order to fire the gun. The contact-pin m is inclosed in a casing n of vulcanized fiber, by which it is insulated, and a spring presses it outward. Behind the ring l and the flap l' is an insulating-cap of vulcanized fiber o. (Shown separately by Fig. 8.) In this cap there is an opening for the contact-pin m to pass. The cavity in the breech-block is closed in rear by a screw-plug p, and a packing of india-rubber and a steel disk is interposed between the plug and the insulating-cap o.

At the fore part of the breech-block there is a pin q, pressed forward by a spring q', and when the breech is closed this pin makes contact with the electric fuse of the cartridge. The spring q' abuts on the disk r, and this, together with the spring and pin, is insulated by the case s, of vulcanized fiber, in which the parts are contained. A steel needle t passes through the silver tube e, and when it comes into contact with the disk r it establishes electrical connection between the pin q and the silver plates of the battery-cell. The needle t, however, is pressed rearward by the spring t' against the insulating-cap l^2, of vulcanized fiber, inserted into the flap l'. When the contact-rod m is moved inward by the outer contact-rod c being made to abut upon it, it displaces the flap l', overcoming the spring t' and the needle t by its fore end making contact with the disk r. The battery-current then passes from the silver plates to the tube e, thence to the needle t, the disk r, and the pin q. As the pin q is in contact with the electric fuse of the cartridge the current traverses the fuse and so passes to the metal of the gun. The current thus reaches the ring b, from whence it passes by the contact-pins $c\,m$ (which at this time are thrust inward) to the flap l' and bar i, and so to the zincs g of the battery-cell. The circuit thus being complete, the gun is fired.

If desired, the needle t may be prolonged to make direct contact with the electric fuse in place of providing intermediate parts; but the arrangement shown is preferable.

It is not essential to my invention that the battery-cell should consist of the elements above enumerated. Other elements may be substituted; but I prefer the arrangement described.

What I claim is—

1. The combination of a movable breech-block, a battery contained therein, and mechanism for closing the circuit of this battery through the electric fuse of the cartridge.

2. The combination of a breech-block turning in a ring pivoted to the gun, a battery contained within the block, a contact-maker at the fore end of the block making contact either directly or through another contact-maker with the electric fuse of the cartridge, a contact-maker radial to the block, and firing mechanism carried by the ring, the radial contact-maker being so placed that its outer end comes opposite to the firing mechanism,

by which it is actuated and the circuit closed when the breech is completely shut.

3. The combination of a breech-block, a battery contained within the block, a tube passing through the battery and connected to one of the plates thereof, a contact-making pin passing through the said tube, one end of the pin making contact either directly or through a contact-maker with the electric fuse of the cartridge, and mechanism for operating the other end of the pin and closing the circuit.

4. The combination of a breech-block turning in a ring pivoted to the gun, a battery contained within the block, a tube passing through the battery and connected to one of the plates thereof, a contact-making pin passing through the said tube, the fore end of the pin making contact with the rear end of a contact at the front of the block, the fore end of which makes contact with the electric fuse of the cartridge, a flap connected to the other plate of the battery and resting against the rear end of the pin, but insulated therefrom, a contact-maker radial to the block and in contact with and actuating the flap, and firing mechanism carried by the ring and coming opposite to the radial contact-maker when the breech is completely shut.

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