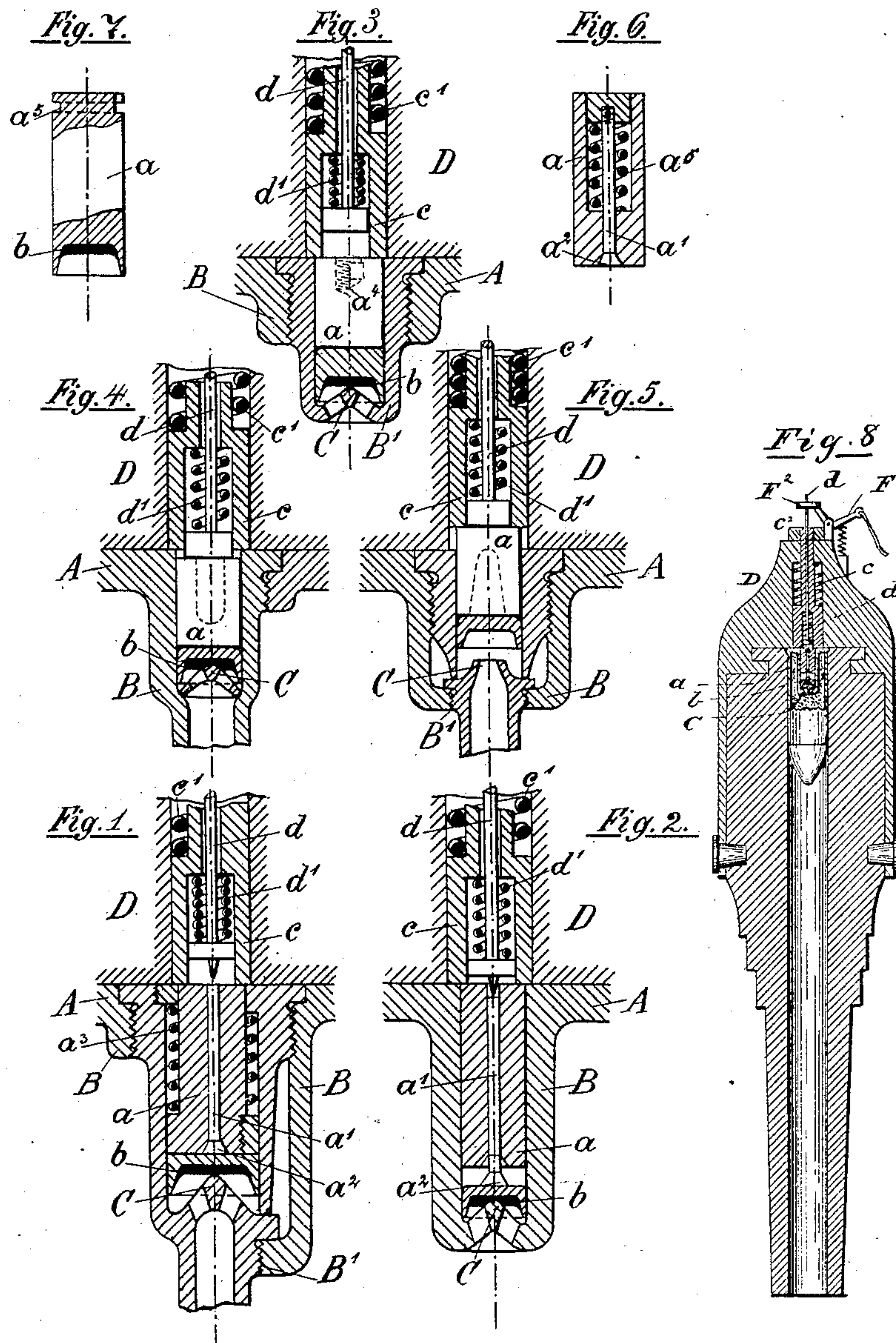


(No Model.)

W. LORENZ.  
PERCUSSION FUSE.

No. 381,264.

Patented Apr. 17, 1888.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

WILHELM LORENZ, OF CARLSRUHE, BADEN, GERMANY.

## PERCUSSION-FUSE.

SPECIFICATION forming part of Letters Patent No. 381,264, dated April 17, 1888.

Application filed June 22, 1887. Serial No. 242,099. (No model.)

*To all whom it may concern:*

Be it known that I, WILHELM LORENZ, of Carlsruhe, Baden, in the Empire of Germany, have invented a certain new and useful improvement relating to percussion-fuses or reaction-plugs in metal cartridge-cases for breech-loading cannons, for utilizing the action of the explosion-gases for driving back the striking-bolt and appurtenances; and I do hereby declare that the following is a full and exact description thereof.

The reaction-plugs are so disposed between the striker and the primer in the cap-chamber of metal cartridge-cases, or in the priming contrivances applied to such cartridge-cases, as to be moved forward by the action of the striking-bolt, and thus carried with the primer against the anvil, and afterward at the explosion of the powder, in consequence of the great force produced by the gases, to be thrown back to a certain extent and out of the cap-chamber. The invention allows me by means of such backward movements or recoils to operate automatically on the lock mechanism in the breech of the arm to compress the spring of the striker and push back the striker into its initial (starting) position. The power thus obtained may be utilized in other ways—as, for example, to disengage an arresting contrivance of the breech-piece of the arm—and thus to open the breech or to effect useful operations, which otherwise would be made in opening and charging again the arm. The reaction-plug is larger than the striking-bolt, but smaller than an annular casing which surrounds the latter in the breech of the arm. This annular casing is subject to the force of a stronger spring than that which actuates the striking-bolt. It is restrained by suitable means, so that it cannot move forward too far. It is ready to move backward when subjected to a sufficient force. When the primer receives the great force of the discharge of the arm it moves backward, carrying the striking-bolt and also the annular case with it. The striking-bolt on being carried back far enough is engaged by its proper detent in the locked position, while the annular casing urged forward by the constant force of its strong spring moves again to its original position so soon as the force of the explosion is past.

The accompanying drawings form a part of

this specification and represent what I consider the best means of carrying out the invention. All are central longitudinal sections. They show very clearly the several stages of the action. They illustrate, also, some varieties in the forms and constructions. To save labor I have shown some varieties of construction in the same series of figures, which show the successive stages of the action. In two of the figures the left side shows one construction and the right side another. All are alike in the essential points.

Figure 1 shows all the conditions when all is ready for firing, but not yet moving. Figure 2 shows the conditions at the moment of the forward movement of the striking-bolt to discharge the piece. The remaining figures show modifications. Figure 3 shows a modification in which the conditions correspond to Fig. 1. Figure 4 shows the same corresponding to Fig. 2. Figure 5 shows the same a brief period later, when the discharge is taking place. Figure 6 shows a modification of the reaction-plug. It has a coiled spring acting on the central pin. Figure 7 shows another modification of the reaction-plug. It is solid, with a circumferential groove at the rear to facilitate its extraction. Figure 8 is a central horizontal section through an entire gun having this invention applied. The breech-block swings on trunnions and locks strongly with the breech of the gun, as shown. The general construction of the gun is identical with that set forth in United States patent to Nathan Thompson, numbered 130,452, and bearing date August 13, 1872.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A is a metal cartridge case of any construction and of any bore.

B is a cap-chamber made solid with the same.

B' is the cap-chamber of a priming contrivance, which is either screwed or pinched or otherwise fixed in the cartridge-case.

The anvil C may in the ordinary way be fastened to the bottom of the cartridge-case or to the primer of the same by pressing, screwing, pinching, &c., and may have its usual conical form or may be made annular.

D represents the breech-piece of the arm, of



any ordinary or suitable construction. The reaction-plug  $a$ , which if required is greased, is inclosed in the cap-chamber  $B'$ , with its rear end flush with the cartridge-case bottom. The primer  $b$ , which we will assume is simply a percussion-cap, lies close to the plug. For better extraction, the plug may be provided with a hole or worm,  $a^4$ , Fig. 3, or with a notch,  $a^5$ , Fig. 7, or with any other suitable provision to facilitate seizing the same by means of a suitable instrument.

In the breech-piece  $D$  there is disposed a case,  $c$ , which, by means of a strong spring,  $c'$ , is always forced against the metal cartridge-case and against the plug  $a$ , being arrested by a suitable stop,  $c^2$ , so as to lie with its front end exactly flush with the front face of the breech-piece. In this case  $c$  there is disposed a striking-bolt,  $d$ , which, by a spring,  $d'$ , of less force than the spring  $c'$ , is pushed against the plug  $a$  as soon as the trigger  $G$ , Fig. 8, is pulled for firing. By this action the reaction-plug, with the primer, is pushed against the anvil, (position Fig. 4,) and the charge is exploded. Then, by the action of the gases against the plug  $a$ , it is driven back and partially out of the cap-chamber, thereby forcing the striking-bolt, with its case  $c$ , backward in the breech-piece, as shown in Fig. 5.

The parts are so arranged as to bring back the striking-bolt to its initial position, (starting-point,) (see Fig. 1,) in order to be there engaged and held by ordinary means—as, for instance, by the disk  $F^2$  on the bolt  $d$ , with which a spring-actuated catch,  $F$ , engages for supporting it. When the gun has been fired and the pressure of the explosion-gases has ceased, the case  $c$ , forced by the spring  $c'$ , advances again and forces the plug  $a$  back into its initial position, Fig. 1—that is, flush with the bottom of the cartridge-case—by compressing together the spring  $d'$  against the band of the arrested striking-bolt. This movement compresses the spring  $d'$ , which consequently must be weaker than the spring  $c'$ . Thereupon the breech may be opened, the entire cartridge-case and primer, with plug, withdrawn, and a new cartridge-case, with its powder and projectile, with new primer and plug, may be introduced. Then the gun, after closing and securing the breech, will again be ready for firing.

In order that the striking-bolt may not have to push the whole plug  $a$  forward, but only a portion of the same, of small weight, there may be disposed in the reaction-plug a small bolt or pin,  $a'$ , which is driven forward by the striking-bolt to explode the primer. Fig. 1 shows such a construction and arrangement of the parts before disengaging the striking-bolt. On the firing of the charge the percussion-cap with the pin and the striking-bolt are driven back so far that the head  $a^2$  will bear against plug  $a$ , whereupon all the parts,  $a$ ,  $a'$ ,  $b$ ,  $c$ , and  $d$ , are forced back into the breech-piece  $D$ , as shown in Fig. 5. In order that such plug may retain exactly the proper

position in the cap-chamber, it may be retained there by any convenient contrivance which does not impede its backward motion produced by the recoil due to the explosion. For example, a spring,  $a^3$ , may be employed, which holds the plug in its proper position, as shown in Fig. 1, on the left side. This spring will by the said recoil undergo a corresponding compression.

In an analogous way the pin  $a'$  may be secured against leaving its place prematurely by a spring,  $a^5$ , Fig. 6. Such a spring will also serve to urge the pin back to the right position. The backward movements of the striking-bolt  $d$ , or of the striking-bolt with its guide-case  $c$ , are effected with rapidity and energy, and the motion may be utilized in various ways for effecting any functions—as for automatically driving back and arresting the striking-bolt, or for cocking the lock, or for unlocking the breech-piece, or for opening the breech, or for effecting two or more of these functions together, or any analogous work which otherwise would be done by hand after firing, thus saving the corresponding manipulations. For example, as before mentioned, the striking-bolt in its utmost back position may be retained by an arresting contrivance, (a catch-spring, latch, bolt, &c.,) and the striking-spring  $d'$  be compressed by means of the stronger spring  $c'$ , working on the advancing case  $c$ ; or the retiring of the striking-bolt or of the case  $c$  may be used for withdrawing a contrivance which holds the breech in its closed position, (as, for example, a spring, a latch, a bolt, a lever, &c.,) so that the breech may be opened; or there may, by such backward motions of the striker or of its guide-case, or of both these parts, be a displacing or a turning of the breech-piece, so as to automatically open the breech or to automatically prepare for this operation.

Fig. 2 shows the striking-bolt pushed forward and the pin  $a'$ , with primer  $b$ , forced against the anvil  $C$ .

The plug may be made solid, Fig. 3, or may be hollow, Figs. 1 and 2. It may be made in one with the primer, as shown in Fig. 7. Such reaction-plugs may be applied to all cartridge-cases of any construction and bore which are provided with cap-chambers  $B$  of sufficient dimensions, and may be employed for arms of every description, especially for small and large field and position guns, mountain-howitzers, and revolving guns, &c. They reduce the manipulations usually necessary after firing for the introduction of a new charge. They make the service simpler and easier and permit a greater number of shots than heretofore in a given time.

I claim as my invention—

1. In a primer for cartridges, the cartridge-case  $A$ , anvil  $C$ , cap  $b$ , resting on said anvil, and reaction-plug  $a$ , sliding within said cartridge-case behind said cap, in combination with the breech-piece  $D$ , arranged behind and in alignment with the cartridge-case, the guide-



case *c*, sliding within said breech-piece, the strong spring *c'*, forcing said guide-case forward, the striking-bolt *d*, sliding within said guide-case, and the weak spring *d'*, forcing said firing-pin forward, as and for the purpose set forth.

2. In a primer for cartridges, the cartridge-case A, anvil C, cap *b*, resting on said anvil, and reaction-plug *a*, sliding within said cartridge-case behind said cap, in combination with the breech-piece D, arranged behind and in alignment with the cartridge-case, the guide-case *c*, sliding within said breech-piece, said guide-case being of larger diameter than said reaction-plug, the strong spring *c'*, forcing said guide-case forward, the stop *c''*, limiting such forward movement, the striking-bolt *d*, sliding within said guide-case, said striking-bolt being smaller in diameter than said reaction-plug, and the weak spring *d'*, forcing said firing-pin forward, as and for the purpose set forth.

3. In a primer for cartridges, the cartridge-case A, anvil C, cap *b*, resting on said anvil, longitudinally-perforated reaction plug *a*, sliding within said cartridge-case, and firing-pin *a'*, sliding within the perforation in said reaction-plug, in combination with a breech-piece, D, arranged behind and in alignment with the cartridge-case, a spring-actuated guide-case, *c*, therein, an independently spring-actuated striking-bolt, *d*, within said guide-case, and means for tripping said striking-bolt and thereby exploding the cap, substantially as described.

4. In a primer for cartridges, the cartridge-

case A, anvil C, cap *b*, resting on said anvil, internally-recessed and longitudinally-perforated reaction-plug *a*, sliding within said cartridge-case, firing-pin *a'*, sliding within the perforation in said reaction-plug, and spring *a''*, disposed in the recess in said reaction-plug and operating to draw said firing-pin back within said plug, in combination with a breech-piece, D, arranged behind and in alignment with the cartridge-case, a spring-actuated guide-case, *c*, therein, an independently spring-actuated striking-bolt, *d*, within said guide-case, and means for tripping said striking-bolt and thereby exploding the cap, substantially as described.

5. In a primer for cartridges, the cartridge-case A, anvil C, cap *b*, resting on said anvil, reaction-plug *a*, sliding within said case, and spring *a''*, for pressing said plug gently against the back of the cap, in combination with a breech-piece, D, arranged behind and in alignment with the cartridge-case, a spring-actuated guide-case, *c*, therein, an independently spring-actuated striking-bolt, *d*, within said guide-case, and means for tripping said striking-bolt and thereby exploding the cap, substantially as described.

In testimony whereof I have hereunto set my hand at Berlin, this 24th day of November, 1886, in the presence of two subscribing witnesses.

WILHELM LORENZ.

Witnesses:

B. ROI,

C. GROMIS.