B. B. HOTCHKISS.

PERCUSSION FUSE.

No. 190,861. Patented May 15, 1877.

Fig. 1.

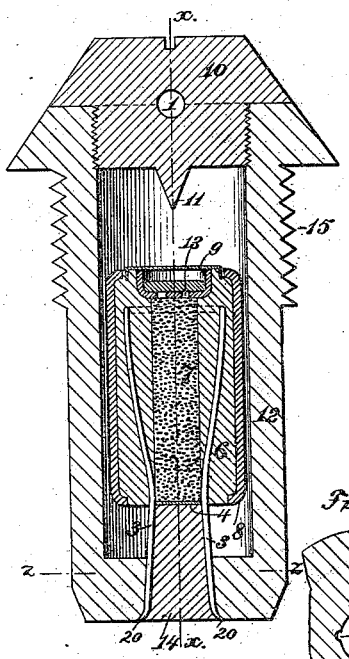


Fig. 2.

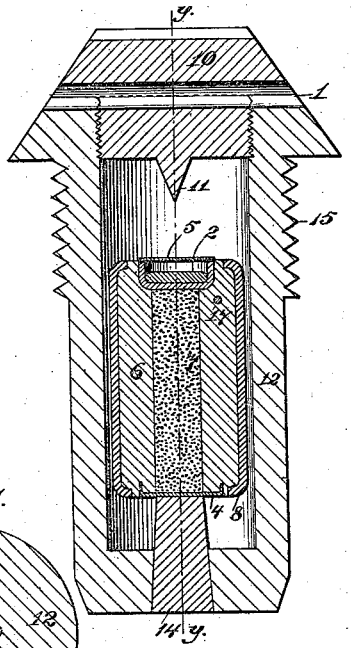


Fig. 7.

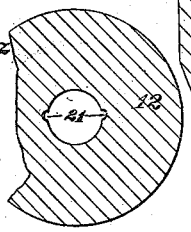


Fig. 3.

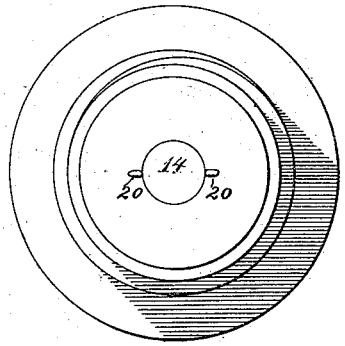


Fig. 4.

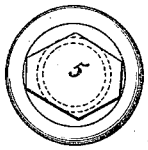


Fig. 5.

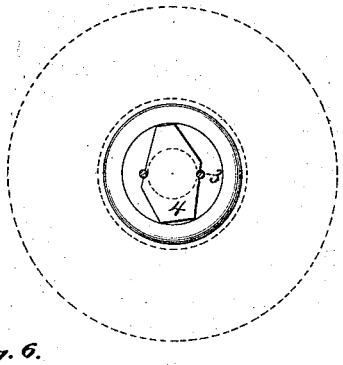
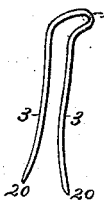


Fig. 6.



Witnesses;

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UNITED STATES PATENT OFFICE.

BENJAMIN B. HOTCHKISS, OF NEW YORK, N. Y.

IMPROVEMENT IN PERCUSSION-FUSES.

Specification forming part of Letters Patent No. **190,861**, dated May 15, 1877; application filed January 31, 1877.

To all whom it may concern:

Be it known that I, BENJAMIN B. HOTCHKISS, of the city, county, and State of New York, (now temporarily residing in Paris, France,) have invented a certain new and useful Improvement in Percussion-Fuses, of which the following is a specification:

In the accompanying drawings, Figure 1 is a longitudinal section on line *y* of Fig. 2; Fig. 2, a similar view on line *x* of Fig. 1; Fig. 3, a plan view of the bottom end of the fuse-case; Fig. 4, a similar view of the front end of the plunger; Fig. 5, a similar view of the rear end of the plunger; Fig. 6, a perspective view of the safety-wires or plunger-detent, and Fig. 7 a transverse sectional view on line *z* of Fig. 6.

In practice, shells provided with percussion-fuses are not infrequently prematurely exploded during their flight through the air by means of the untimely movement of the fuse-plunger, which, coming into contact with the firing-pin, causes the ignition of the charge. This premature movement of the fuse-plunger is effected either by the centrifugal action derived from the rotation of the shell, which urges the plunger forward, or such movement causes the plunger-detent to become loosened, whereupon the plunger is free to be moved forward by its gravity at the time when the shell has passed the highest point of its trajectory and is descending. In either of these cases the shell will explode in midair and its effectiveness be destroyed.

The object of this invention is to securely retain the plunger in a position of non-contact with the means which causes the ignition of the fulminate, both at the time of the explosion of the firing-charge and during the flight of the projectile; and it consists in a means which controls the longitudinal and prevents the rotative movement of the plunger in the fuse-case during all of the movements of the projectile until it strikes some object, all of which will be fully hereinafter set forth.

The fuse-case 12 and its closing screw-cap 10, the latter provided on its interior face with the firing-pin 11, and the former having an externa screw-thread, 15, to fasten it into the nose of the projectile, do not differ in any essential manner from similar parts of the well-known percussion-fuses.

In the construction shown, however, a socket, 1, is bored through the screw-cap 10, so as to penetrate the face of the end of the fuse-case 12, whereby, when the cap 10 is screwed into place, a proper tool may be inserted to screw the fuse-case 12 into the projectile without disturbing the cap 10 in its adjustment. Through this socket 1 a fastening-pin might be inserted to lock the parts together and prevent them from being tampered with or otherwise disturbed.

The plunger 6 is formed of a case, 8, preferably made of thin plate metal swaged up so as to form an open-ended cylinder, the ends of which are partially closed by turning the sides inwardly, thus forming flanges.

This plunger is provided with a lining of lead or other suitable dead metal, so disposed within it as to form a weighty body pierced centrally by a longitudinal chamber, which receives the charge 7 of powder.

The powder-chamber in the plunger is closed at its lower end, so as to preserve the charge 7 from disturbance by means of a thin metal cap, 4, held in place by spurs, which are forced into the metal body.

The upper end of the plunger is provided with a cavity, which receives an inverted cap, 9, containing the fulminate 2, and this cap is perforated with holes 13 communicating with the charge-chamber.

Over the upper end of the plunger a thin metal cap, 5, held in place by spurs protruding into the metal body of the plunger covers and protects the fulminate.

The lining or body of the plunger is formed preferably by casting, soft metal, such as lead, being employed.

In the process of casting, a safety-detent, consisting of a wire bent into the form shown in Fig. 6, is suspended in proper position, so that its looped end 17 shall partially encircle the charge-chamber, while its legs 3 3 lie in a central position, and extend from the base end, at opposite points thereof, which are close to the inner surface or walls of the charge-chamber, as is seen in Figs. 1 and 5.

This detent is thus fastened securely in the plunger-body, and protrudes therefrom in the form of spring-legs, which lie in recesses 21 in the bottom end of the fuse-case, and have hooked ends 20 20, which engage over the edges of the openings 21 in the end of the fuse-case.

It is not essential that the two legs 3 should be joined together by the bend 17, though, for convenience of manufacture, this form is preferred.

Two short wires, with flattened or bent ends to hold them in the lining or body of the plunger, might be fixed so as to protrude and operate as do the legs 3 of the single-wire detent described.

Furthermore, a single detent-wire, with hooked end, in connection with the recess 21 in the bottom end of the fuse-case, may be used, since the long bearing afforded by said recess will securely hold the single wire detent in place, and through it prevent the plunger from rotating.

A conical safety-plug, 14, of soft metal is inserted into the opening in the foot of the fuse-case, forcing the legs 3 3 of the detent snugly into the recesses 21, and holding them in place.

This percussion-fuse is inserted in the end of a projectile in any ordinary manner, screwing being the preferable mode, and operates as follows:

Under the impulse of the firing-charge, which propels the projectile from the gun, the safety-plug 14 is loosened and driven backward into the powder-chamber of the projectile, thus leaving the plunger 6 supported in place by the spring-legs 3 3 of the detent.

The same force also carries the plunger against the inner surface of the bottom end of the fuse-case, from the effect of which sudden and powerful blow its tendency will be to rebound with force sufficient to break the detents loose from their hold, and permit the plunger to move forward upon the firing-pin, and to be prematurely discharged. To prevent this rebound and the ill effects resulting from it, the lining of the plunger is made of a dead or inelastic metal, as lead. When thus constructed, the plunger will, upon the discharge of the cannon, rest itself on the bottom of the fuse-case, and, as the projectile flies through the air, turning under the rotary motion imparted to it by the rifling of the gun from which it was projected, the legs 3 of the detent cause the plunger to partake of a like rotary motion—that is, it is forced to rotate with the projectile, and will then gradually work forward until the detent wire or wires bearing upon the bottom end of the fuse-case limit its further forward movement.

Percussion-fuses, heretofore constructed, have had a detent formed of a single wire, which, holding upon the fuse-case at one point only, would allow the plunger to act inefficiently, for the reason that, being entirely free, so far as its rotary motion is concerned, and being somewhat smaller than the chamber in the fuse-case, and, therefore, without sufficient frictional bearing therein to force it to move with said case, it would rotate and creep or work forward with a power sufficient to either twist off or detach its single detent-wire, and, thus freed, allow it to impinge upon the firing-pin forcibly enough to ignite the fulminate and discharge the shell, and even when thus released from the control of the detent-wire, if the rotative movement of the projectile is not sufficient to propel the plunger onto the firing-pin, it will be carried forcibly against the same by the action of gravity when the highest point of the trajectory of the shell is passed and its descent is taking place.

In the improved construction the two legs 3, bearing, as they do, at opposite points, and resting in slots or depressed seats in the fuse-case, prevent the rotation of the plunger 6 independently of a like movement of the projectile, while their spring action, forcibly holding the legs 3 of the detent firmly seated in the slots or seats 21 in the fuse-case, and thereby causing the hooked ends 20 to firmly bear upon the end of said fuse-case, prevents any forward or longitudinal movement of the plunger.

Perfect security against any displacement of the plunger is thus obtained, either during the flight of the projectile through the air or from any ordinary shock which it may receive in transportation, handling, or in dropping a short distance.

When, however, a shell provided with this fuse is projected by any considerable power, and strikes any object with great force, as in being discharged from a cannon, the effect of the concussion will be to overcome the retaining power of the spring-legs 3 of the plunger-detent, and detach them from their hold upon the fuse-case, thus suddenly forcing the plunger forward upon the firing-pin 11, which, penetrating the protecting-cap 5, will cause the ignition of the fulminate 2, and the consequent explosion of the shell, as hereinbefore explained.

The plunger might be provided with one or more lateral wings running in grooves in the interior face of the fuse-case, which construction would admit of the successful use of one detent-wire, and would prevent the independent rotative movement of the plunger.

The scope of this invention is, therefore, to be understood to include a plunger and fuse-case, provided with a means for preventing the rotation of the former within the latter, which, at the same time, permits the free longitudinal movement of the plunger under the shock of impact.

What, therefore, is claim —

1. The combination of the fuse-case, plun-

ger, and two detent wires or legs, 3 3, substantially as described.

2. The combination of the plunger, detent-wire 3, and fuse-case, provided with a socket, 21, substantially as described.

3. A percussion-fuse, consisting of a case and plunger, carrying powder, provided with devices, substantially as described, which prevent the rotative movement of the plunger within the case.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

B. B. HOTCHKISS.

Witnesses:
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