(No Model.)

E. L. ZALINSKI.

ELECTRIC SHELL FUSE.

No. 341,536. Patented May 11, 1886.

Fig. 1.

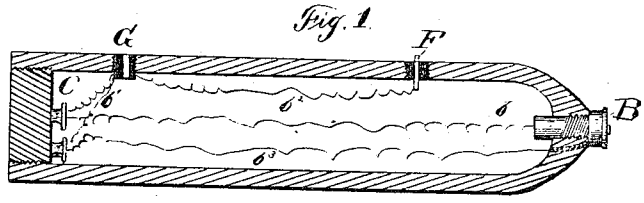


Fig. 4.

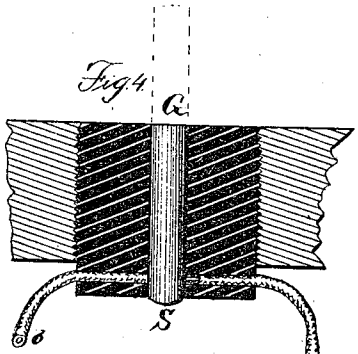


Fig. 3.

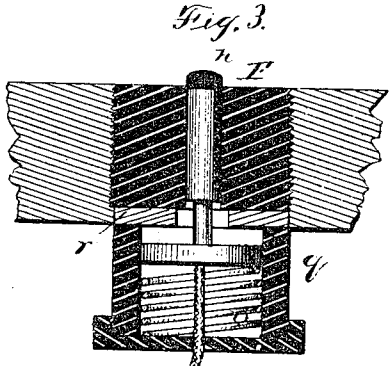


Fig. 2.

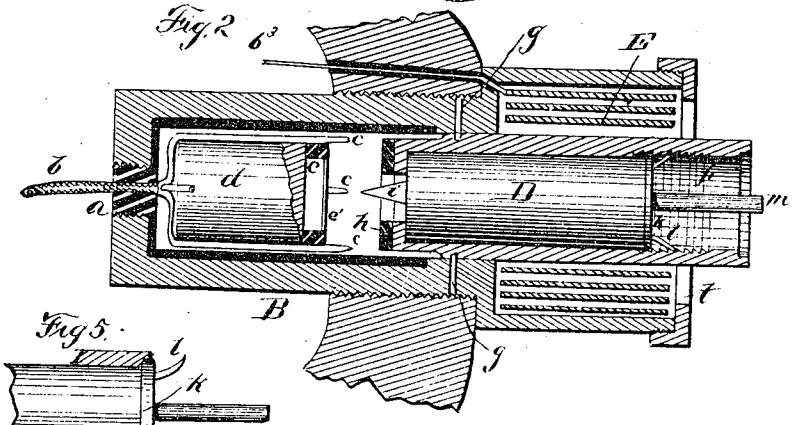


Fig. 5.

Witnesses
M. L. Williams
T. F. Brawner.

Inventor
Edmund L. Zalinski
By his Attorney
William A. Bartlett

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UNITED STATES PATENT OFFICE.

EDMUND L. ZALINSKI, OF THE UNITED STATES ARMY.

ELECTRIC SHELL-FUSE.

SPECIFICATION forming part of Letters Patent No. 341,536, dated May 11, 1886.

Application filed December 30, 1885. Serial No. 187,139. (No model.)

To all whom it may concern:

Be it known that I, EDMUND L. ZALINSKI, of the United States Army, stationed at Fort Hamilton, State of New York, have invented certain new and useful Improvements in Electric Fuse and Method of Firing Projectiles Thereby, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to electric fuse for projectiles.

The invention consists in the construction of the fuse and its connections and the circuit making and breaking apparatus.

My improved fuse is specially intended for use with projectiles and projectile torpedoes charged with dynamite or other high explosive, but may be used with projectiles charged with gunpowder, when found advisable.

Figure 1 is a longitudinal section of a projectile, showing the relative location of the various parts of my fuse device. Fig. 2 is a longitudinal section of a wet and dry battery fuse. Fig. 3 is a section of the safety circuit-breaker. Fig. 4 is a similar section of an auxiliary safety circuit-closer. Fig. 5 is a detail showing the base of the electric battery which ignites on concussion.

A indicates the body of a projectile, which may be of any usual form.

B designates the fuse, which is shown in the point of the shell, but may be in the base or any other part, and the battery in said fuse is connected with a detonating charge, C, preferably at the base of the charge in the shell, to secure the greatest results of the explosion.

The fuse B contains the wet battery D and dry battery E; but under favorable circumstances for such use either battery may be dispensed with. One element of the battery is connected to the detonator by a wire; but the return-circuit is preferably through the metal of the body of the projectile. The wire from the wet battery is preferably broken at one or two points, as F and G, in such manner that the circuit can be closed or opened at those points by instrumentalities extending outside the projectile.

The fuse-case B is of metal, having an insulating-piece, *a*, at its inner end. The wire *b* passes through this piece, and is joined to three, four, or more small copper bars, *c c c*, which extend lengthwise inside the fuse case, but are insulated from it. A plunger, *d*, is held loosely between the wires or bars *c*, but with sufficient friction to prevent it from moving by its own weight, even if the fuse be reversed. This plunger *d* has an annulus, *e*, of non-conducting material attached to its face, and a thin disk, *e'*, of rubber, extends across the front of this annulus.

The electric battery D, of substantially the construction shown in my Patent No. 313,150, of March 3, 1885, is inclosed in a strong metallic tube, *f*, which extends forward beyond the end of the fuse case, but is held against movement therein by pins *g.g*, which enter the fuse-case and the tube. The inner end of tube *f* may be faced with a non-conductor, *h*, and is turned in so as to prevent the escape of the battery from the inner end of the tube. The inner end of the battery has a sharp point, *i*, connected to one battery element, and the other element connects by metallic contact with the tube *f*, fuse-case and shell-body. The outer end of the battery D has a ring, *k*, of soft metal, a little too large to enter the tube *f*, but capable of compression or of being cut away by the shock of firing the projectile in the gun, so that the battery will move inward, as in Fig. 2, after the gun is fired, but will remain at the outer extremity of the tube, Fig. 5, until the firing. Springs *l l*, engaging corrugations in the tube, prevent the escape of the backward movement of the battery during the flight of the projectile, and a projecting piece, *m*, holds the battery against forward movement when the shot strikes a target.

When a fuse constructed as described is placed in the front end or point of a projectile, the battery D is held out of possible contact with plunger *d* by the ring *k* engaging the end of tube *f*. When the gun is fired, this ring strips, and the battery D moves to the bottom of the tube *f*. At the same time the plunger *d* moves to the inner end of the fuse-case, so that there is no contact between the battery and plunger. If the projectile strikes in the water, the plunger *d* will move forward and the point *i*, penetrating the diaphragm *e'*, will enter or engage the metal of plunger *d*, thus closing circuit through the detonator and firing the

charge, the amount of movement of the plunger determining the delay in firing.

The rubber diaphragm e' serves to protect the face of plunger d from a coating of dirt or oil, and also acts as a possible safeguard to prevent contact between the plunger and battery, except by reason of such a shock as will rupture the diaphragm.

It is important that the explosion shall begin at the rear of the charge and not be caused by the shock of striking a target. Thus, when the projectile strikes a solid target, (as an armored ship,) the tube f will be driven in, shearing off the pins g, and causing the battery to engage the plunger before the projectile strikes the target with such force as to explode the charge by concussion. The extension m serves to hold the battery foward in the tube f.

To prevent explosion of the charge in the gun, the circuit through wire b b' b^2 is broken at F by a connection operating as follows: A push-pin, n, forced out by a spring, o, is held in the insulated plug q in the side of the projectile. The head of pin n will come in contact with metal r, and so make connection with the body of the projectile whenever the pin is free to move out under the impulse of its spring; but when the projectile is entered in the gun the pin n will be pressed in by the walls of the gun, so that circuit will be broken as long as the projectile is in the gun, but will be closed when it leaves the muzzle. A somewhat similar arrangement at G enables the circuit to be broken all the time until the metallic pin S is inserted between the ends of wires b' b^2. This pin will not be inserted until the pin n has entered the breech of the gun, so that circuit is broken at F. The gunner thus has it in his power to prevent explosion in the gun by reason of the closing of the battery-circuit, no matter what may happen to the battery and plunger.

Should the retardation of the projectile when entering water be insufficient to throw the plunger forward and fire the charge from battery D, or should it be desired to throw the projectile into the water and explode it after a few seconds, the dry battery E will fire the projectile, without aid from battery D, in the following manner: The dry battery contains the chemical elements necessary to produce an electric current when made sensitive by the admission of water. One element is connected to the detonator through wire b^3. The other connects with the fuse-case and body of the projectile. When the projectile enters the water, the entrance of liquid at t sensitizes the battery in the course of a very few seconds, and the charge is fired thereby. The time required for the entrance of water may be regulated within reasonable limits, so that the projectile will explode at a greater or less depth, thus making the projectile a formidable torpedo destroyer.

It will be understood that the constructions shown are diagrammatic, and may be varied by the substitution of equivalents without departing from the spirit of this invention.

I do not claim herein the method of exploding the projectile by admitting water to the dry battery, such method being claimed by me in an application filed February 3, 1886, to which application the Patent Office has given the Serial No. 190,705. In this application I illustrate the application of the circuit-breaker to the battery-wires, whether the battery be sensitized or not.

I claim—

1. A projectile having an electric battery contained therein and a mechanical connection extending to the exterior of the shell, whereby the circuit may be broken or closed.

2. A projectile having an electric battery and battery circuit contained therein and a circuit breaker extending outside the projectile and having a bearing against the walls of the gun, so as to be operated to break circuit by the pressure of the walls of the gun.

3. The combination, with an electric battery contained in a projectile, of a projecting piece which drives in the battery to close circuit on contact with a solid target.

4. The combination, in a shell-fuse, of an electric battery, a metallic contact-piece, and an interposed diaphragm between the battery and said piece, and a perforating-point in line with said diaphragm to penetrate said diaphragm.

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

EDMUND L. ZALINSKI.

Witnesses:
W. H. GREENLAND,
W. L. CANDEE.