(No Model.)

E. L. ZALINSKI.

SHELL FUSE.

No. 384,664. Patented June 19, 1888.

Fig. 1.

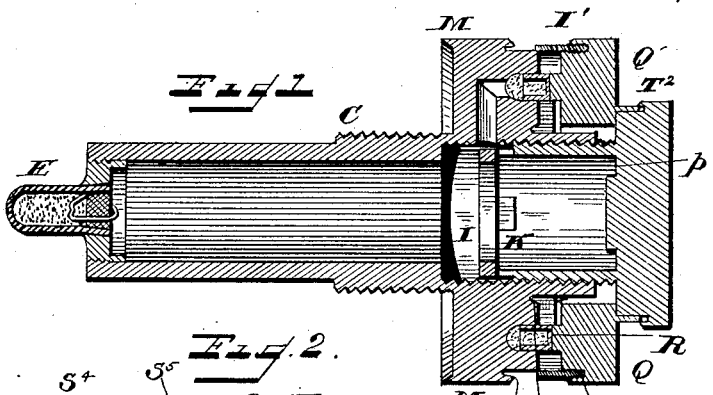

Fig. 2.

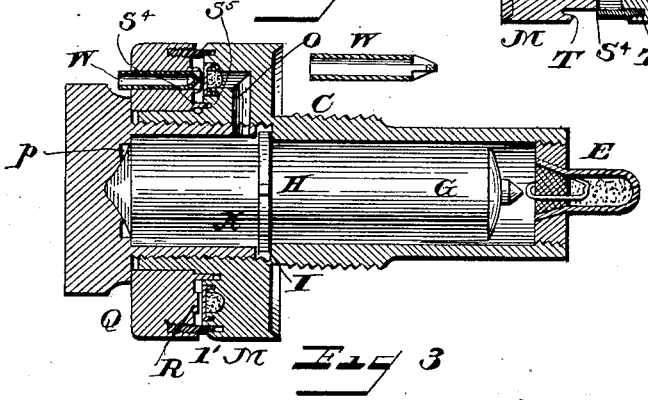

Fig. 3

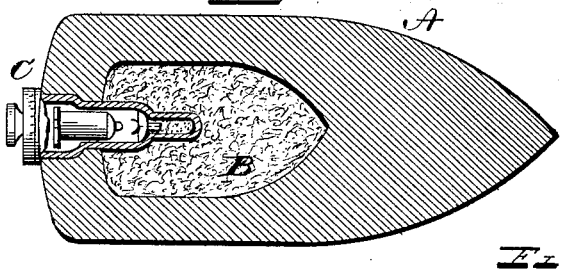

Fig. 4

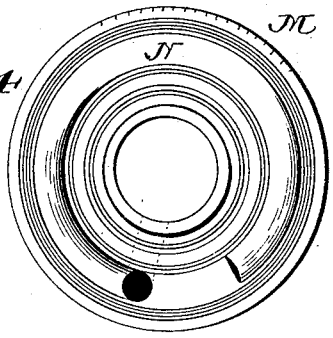

Fig. 5.

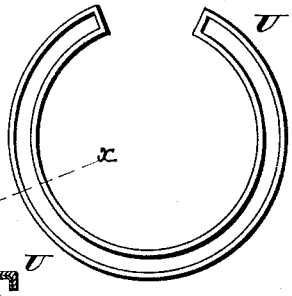

Fig. 6.

WITNESSES.

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EDMUND L. ZALINSKI, OF THE UNITED STATES ARMY.

SHELL-FUSE.

SPECIFICATION forming part of Letters Patent No. 384,664, dated June 19, 1888.

Application filed January 10, 1888. Serial No. 260,314. (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, New York, have invented certain new and useful Improvements in Shell-Fuses, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to base-burning shell-fuses, being a time or impact fuse applied to the base of a shell or projectile of ordinary construction.

The invention consists in certain details of construction, whereby a very perfect gas-check is obtained; also, in a mechanism or combination of mechanisms by which a time-fuse may be made to burn with a great uniformity of combustion; also, in mechanism for protecting the time composition from extraneous influences, so that it may burn uniformly; also, in various details, as hereinafter pointed out and claimed.

In the drawings, Figure 1 is a longitudinal central section of a base-burning fuse, the battery being omitted. Fig. 2 is a similar section of a fuse slightly modified from that shown in Fig. 1, the battery being in place. Fig. 3 is a section showing the general relation of the fuse to the projectile. Fig. 4 is a face view of the fuse-flange, showing the grooves therein; and Fig. 5 is a plan of the detachable powder-holding trough. Fig. 6 is a section of the same on line *x x*, Fig. 5.

The letter A indicates the body of the shell, having charge-chamber B and fuse C. The fuse C screws into the base of the shell, and the screw-thread of the fuse and cap is of reverse pitch to that of the rifling of the gun, so that the tendency of the parts will be to screw up, and not screw out, when the projectile is fired.

The cylindrical portion of the fuse-body terminates in a firing charge-chamber, E, which contains an electric primer of usual construction, and may have a percussion-primer and a small bursting or igniting charge. (Shown in Figs. 1 and 2.) The nipple surrounding the chamber E may have solid walls, so that there is no communication. In the latter case the igniting-charge will be sufficient to rupture the walls of the chamber. A small electric battery, G, is contained in the fuse, the action of the battery on the primer being as usual with fuses of this class. The battery G is held by projections H from its periphery between a shoulder, I, and a cap, K, which forms the cover of the fuse. The projections H strip, so as to let the battery slide backward when the shock of firing starts the projectile. The battery is then free to move forward by the concussion of the striking. The flange M of the fuse has an annular groove, N, extending nearly round the face of said flange. This groove contains a quantity of slow-burning powder, and has a radial passage, O, at one end leading to the chamber in which the electric battery or firing-charge is placed. The ring Q has a projecting ledge, R, upon its face in alignment with the groove N, which contains the time composition. The ring Q is surrounded by a thin band or ring, *l'*, which may be soldered to said ring or may fit tightly enough to remain in position. This ring extends forward over the joint between the ring Q and base M of the fuse-casing and makes a very perfect gas-check, the pressure of the firing-charge in the gun serving to compress this ring onto the fuse-casing to seal the joint against the entrance of powder-gas.

The face of ring Q has an annular flange, S^4, extending into a groove, S^5, in the fuse-casing, (or the reverse construction would be equivalent.) This flange and groove serve as an inner gas-check to prevent the gas caused by the combustion of the slow-burning compound finding its way to the interior of the fuse-case. The passage through the firing-pin offers a passage for the escape of gas from the burning compound. The front edge of the shoulder M of the casing projects slightly forward like a knife-edge, and on the firing of the shell will be driven into the base of the projectile or flattened against the base thereof, serving as a gas check or seal to protect the joint where the fuse screws into the shell. In Fig. 1 the slow-burning composition is shown inclosed in a trough, U, which is detachable. The top of this trough comes under the flange R of ring M. The metal surrounding the grooves T and T^2 is thin, and will compress under the gas-pressure of an explosion in the gun.

The ring Q may be turned about its axis so as to bring the firing-pin W in front of any part of the powder in the groove N. This pin W has a sliding movement in the direction of its axis, and when driven forward by the gas-pressure of an explosion of powder will con-

vey fire through its hollow center to the slow-burning-powder charge. The edge of the ring Q has an index by which it may be adjusted, so that the powder in the groove N will be ignited at any prescribed distance from the radial groove O by turning the ring Q on its axis.

The inner end of pin W may bear a bit of fulminate to ignite the powder in the groove N by pressure when the fuse is used in a gun which is discharged by air or similar pressure. The pin W will be driven through the thin metal of the trough U when the same is used.

The trough U is lined with a coating of asbestus or similar non-conducting material, U', or where a separate trough is not used the groove in which the composition is placed is lined, or the composition is covered with an asbestus, mica, or similar composition which is a non-conductor of heat and is non-combustible. This coating prevents the transmission of heat from the firing-charge in the gun to the composition, and enables the latter to burn under practically similar conditions without regard to the temperature of the metal parts of the fuse-casing.

The operation of the device is as follows: The battery is inserted in the fuse and retained by its flange or projections until the projectile is fired, when the flange strips and battery "sets back" in the casing, as is common with the plunger of a percussion-fuse. The ring Q is set up snugly when the head of the fuse is screwed home, and the gas-rings enter their corresponding grooves, the ring R bearing firmly on the slow-powder charge or the trough containing said charge. Under the enormous pressure of firing, the ring Q is driven forward, so that the gas-rings are more firmly seated in their grooves or around the casing, and the surrounding metal (which may come to a knife-edge) is compressed on the rings. The projection R compacts the powder composition to such an extent that it cannot burn freely as it would under light pressure, but is compelled to burn slowly, as it would under normal conditions. The pin W is driven into the composition and ignites it, either by means of a fulminate or by permitting the powder-gas to enter through its hollow center. The composition in groove N being thus ignited, will burn along the annular groove until the flame enters radial groove O, when the charge in said groove, or one connected therewith, will shoot the battery forward to close circuit and fire the charge, or the charge in groove O may be sufficient to rupture the casing and so fire the bursting-charge in the shell. The chamber at the rear of the battery will be a little larger in diameter than the battery itself, and will have a small powder-chamber, *p*, in rear of the battery. The space may be filled by a bit of gun-cotton, whereby the flame from radial passage O will be quickly communicated to the powder in chamber *p* to shoot the battery forward into circuit-closing position when the time composition has burned out.

What I claim is—

1. The combination, with an explosive shell, of a fuse entering the base thereof, said fuse provided with a sharp-edged ring which finds a seat against the base of the shell and serves as a gas-check, substantially as described.

2. In a shell-fuse, a casing consisting of two parts, one part slightly movable longitudinally relatively to the other under the pressure of the firing-charge in the gun, and a ring in one section closing into a groove in the other to serve as a gas check, the combination being and operating substantially as described.

3. In a shell-fuse, a two-part casing, one of the parts being slightly movable in a longitudinal direction relatively to the other under the pressure of the gas in the gun, and a gas-check covering the joint between the sections, in combination, substantially as described.

4. In a shell-fuse, a casing having a time composition inclosed therein, a portion of the casing covering said composition being movable relatively to the other part, so as to compress the composition while under the pressure of the firing-charge in the gun.

5. The combination, in a shell-fuse, of a casing having a groove in which a slow-burning composition is placed, and a movable section to said casing having a projection corresponding to said groove, whereby the pressure of the firing-charge against the movable section compresses the same onto the composition, as set forth.

6. In a shell-fuse, the combination of the inclosing-casing, the time-charge of slow-burning compound, and a separate inclosing-envelope for the latter consisting of asbestus or equivalent non-combustible and slow-conducting material, substantially as described.

7. In a shell-fuse, the combination of an electric primer, an electric battery in position to move toward said primer, and an explosive charge in rear of said battery and in position to shoot the battery forward to close circuit with the primer, as set forth.

8. In a shell-fuse, an electric battery, an electric primer in line therewith, an explosive charge in rear of said battery in position to shoot the battery toward the primer, and a time-fuse for igniting said charge, the combination being and operating substantially as described.

9. In a shell time-fuse, the combination of a casing, and a perforated and movable firing-pin extending through said casing to the vicinity of the time composition, and having longitudinal movement, so as to puncture said composition when pressed forward by the explosion of the charge in the gun, substantially as stated.

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

EDMUND L. ZALINSKI.

Witnesses:
PHILIP MAURO,
W. A. BARTLETT.