No. 729,932. PATENTED JUNE 2, 1903.

G. M. & C. F. HATHAWAY.

FUSE FOR SHELLS.

APPLICATION FILED JULY 12, 1902.

NO MODEL.

Fig. 1.

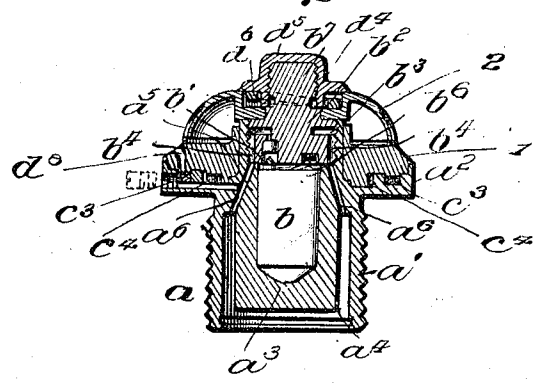


Fig. 2.

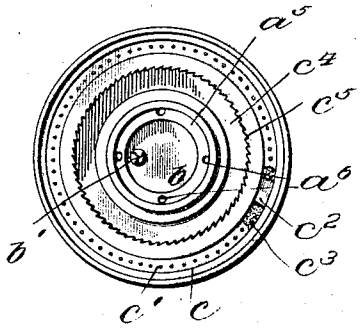


Fig. 3.

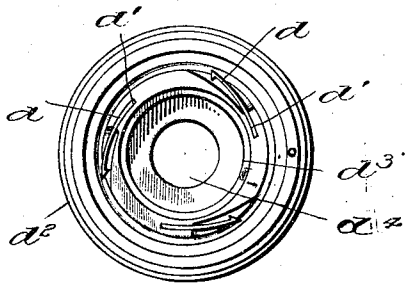


Fig. 4.

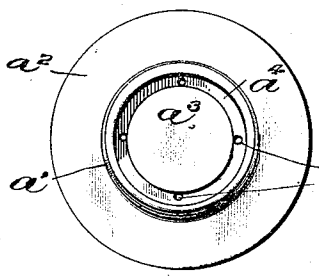


Fig. 5.

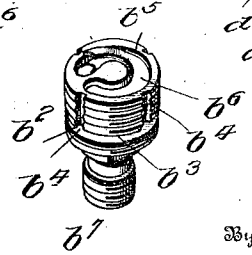
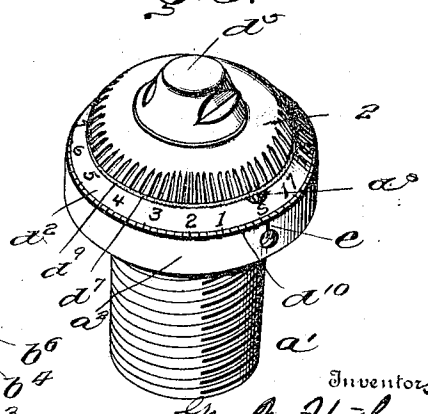


Fig. 6.



Witnesses

Inventors

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No. 729,932. Patented June 2, 1903.

UNITED STATES PATENT OFFICE.

GEORGE M. HATHAWAY, OF WELLSBORO, PENNSYLVANIA, AND CHARLES F. HATHAWAY, OF NEW YORK, N. Y., ASSIGNORS, BY DIRECT AND MESNE ASSIGNMENTS, TO PENNSYLVANIA FUSE AND ARMS COMPANY, OF YORK, PENNSYLVANIA.

FUSE FOR SHELLS.

SPECIFICATION forming part of Letters Patent No. 729,932, dated June 2, 1903.

Application filed July 12, 1902. Serial No. 115,369. (No model.)

To all whom it may concern:

Be it known that we, GEORGE M. HATHAWAY, residing at Wellsboro, in the county of Tioga and State of Pennsylvania, and CHARLES F. HATHAWAY, residing at New York city, county of New York, and State of New York, citizens of the United States, have invented certain new and useful Improvements in Fuses for Shells; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to that class of fuses generally known as "combination-fuses" in which the detonation is accomplished either by the firing of a time-fuse or upon impact of the projectile or shell; and it consists of a chambered fuse-body provided with a timing cap or plug having communication with a powder-train formed in the fuse-body.

The invention also consists in combining with the time-fuse a percussion-fuse for detonating the explosive charge of the projectile upon impact; and the invention also consists of the novel construction, arrangement, and combination of the various parts, as will be hereinafter described, and pointed out in the claims.

The prime object of the invention is to produce a simple and effective combination-fuse which when placed in a shell or projectile will allow such shell or projectile to be handled with absolute safety and yet insure when the gun is fired certain detonation of the explosive charge at a predetermined time or upon impact of the projectile against a target or other object.

Other objects of the invention will become apparent upon a more detailed description thereof.

In the drawings, Figure 1 is a longitudinal sectional view of our improved combination-fuse, the several parts being represented in normal position; Fig. 2, a plan view of the face of the fuse-plug, showing the timing-train and chamber in which the detonating-hammer is seated; Fig. 3, a plan view of the inner face of the time-dial; Fig. 4, a plan view of the opposite face of the fuse-body, showing the chamber for containing the reinforced powder; Fig. 5, a perspective view of the detonating-anvil, showing the powder-train grooves and firing-hole; and Fig. 6, a perspective view of the fuse complete.

In the several views the letter a indicates the fuse-body, consisting of the screw-threaded portion a', which screws into the nose of the shell, a flange portion a^2, and a chambered portion a^3. The screw-threaded portion a' is provided with a chamber a^4, surrounding the chambered portion a^3, in which chamber a^4 is contained the reinforce-powder, and for the purpose of clearness of description we will hereinafter refer to this chamber as the "reinforce-powder" chamber. The chambered portion a^3 projects a short distance beyond the face of the flange a^2, and hereinafter such chambered portion a^3 will be referred to as the "hammer-chamber." The hammer-chamber is counterbored and screw-threaded a short distance, and in the shoulder a^5 are one or more powder-trains a^6, communicating with the reinforce-powder chamber. Seated in the hammer-chamber is a hammer b, provided with a firing-pin b', set radiately from the center. Screwed into the counterbored end of the hammer-chamber is a detonator-anvil b^2, provided with a peripheral powder-groove b^3, and one or more powder-grooves b^4, communicating with the powder-groove b^3 and adapted to register with the powder-trains a^6. The inner face of the anvil is provided with an interrupted groove b^5, in which at one end thereof is secured one end of a spring b^6, the free end of which extends to the edge of the detonator-cap x, which is situated at the other end of the groove b^5 radially from the center of said anvil. The outer end of the detonator-anvil is provided with a screw-threaded hub b^7, the purpose of which will be hereinafter explained.

The inner face of the flange a^2 is provided with a groove c, in which is placed a time-

train of powder protected by a perforated ring c', separated at the point c^2 by any suitable plug, and at one side of such plug is a powder-train c^3, communicating with one of the powder-grooves a^6, which communicate with the reinforce-powder chamber. Surrounding the projecting portion of the hammer-chamber is a groove c^4, the outer wall of which is provided with fine ratchet-teeth c^5, adapted to be engaged by a series of spring-pawls d, having their ends secured in slots d' in the face of a time-dial cap d^2, arranged to rotate upon the inner face of the flange. The time-dial is preferably made in two parts 1 and 2, fitted and secured together in any well-known manner, part 1 being disk shape and part 2 convex-concave in shape. The inner face of the dial-cap or part 1 thereof is provided with a central aperture d^3, through which projects the end of the fuse-body carrying the anvil, and the upper part of said dial-cap or part 2 is provided with a central aperture d^4, through which projects the screw-threaded hub b^7 or outer end of the anvil, and a nut d^5 is employed to force the dial-cap against the face of the flange a^2, a spring-washer d^6 being interposed between the nut and part 1 of the dial-cap to hold them from accidental displacement. The outer face of the dial-cap where the two parts are fitted together is provided with a circumferential powder-groove d^7, which communicates through a firing-hole d^8 with the perforated time powder-train. The powder in groove d^7 is protected by a ring d^9, of soft or fusible metal, and the edge of the dial-cap is provided with graduated marks d^{10}, indicating seconds of time, adapted to register with a zero-mark e on the periphery of the flange.

It will be noted that the dial-cap by reason of the pawls can only be rotated in one direction, and when set to the desired number of seconds the time powder-train will be when the shell is fired ignited by the flash of the gun through the medium of firing-hole d^8. The ignited time powder-train will of course burn in both directions; but owing to the separating-plug at point c^2 communication can only be had with the reinforce-powder chamber in one direction through the powder-train c^3, the separating-plug preventing communication in the other direction.

To insure safety, it is not essential that the dial-cap should be set at the zero-mark, as in other time-fuses, for the reason that there is no interior mechanism to be disarranged by the accidental rotation of the dial-cap.

In firing the projectile from the gun the rotation of the projectile places the hammer, with its firing-pin, in register with the detonating-cap, where it will be held out of contact with said cap by means of the outwardly-projecting free end of the spring until the impact of the shell, when the explosion will occur. In its normal position the firing-pin of the hammer rests in that end of the groove b^5 in which the end of the spring b^6 is secured, and in order to prevent the firing-pin from accidentally contacting with or striking the cap it is necessary to separate the point of rest of said firing-pin from said cap, which is situated adjacent to said point of rest, and this separation is accomplished by the interruption in the groove b^5. The free end of the spring b^6 being bent outwardly prevents the firing-pin from making contact with the cap until the shock of the impact.

Having thus fully described our invention, what we claim, and desire to obtain by Letters Patent, is—

1. In a fuse for projectiles, the combination with a fuse-body having a reinforce-powder chamber, and a flanged head provided with a time powder-train communicating with the reinforce-powder chamber, of a time-dial, rotatable in one direction, provided with an exterior powder-train and a firing-hole communicating with the time powder-train, whereby said firing-hole is adjusted to the requisite position in relation to the time-train.

2. In a fuse for projectiles, the combination with a fuse-body having a reinforce-powder chamber, and a flanged head provided with an interrupted time powder-train communicating with the reinforce-powder chamber, of a time-dial, rotatable in one direction provided with a circumferential powder-train and a firing-hole communicating with the time powder-train, whereby said firing-hole is adjusted to the requisite position in relation to the time-train.

3. In a fuse for projectiles, the combination with a fuse-body having a reinforce-powder chamber, and a flanged head provided with an interrupted time powder-train communicating with the reinforce-powder chamber, and a ratchet-wall, of a rotatable time-dial provided with pawls adapted to engage the ratcheted wall to prevent rotation in one direction, and having a circumferential powder-train and a firing-hole communicating with the time powder-train, whereby said firing-hole is adjusted to the requisite position in relation to the time-train.

4. In a fuse for projectiles, the combination of a loosely-seated hammer having a firing-pin arranged near its outer periphery, an anvil having an interrupted groove in its face, and a spring so arranged in the groove that the hammer will be supported with its firing-pin on one side of the interruption in the groove, out of line with the detonator-cap, in normal position, and on the opposite side in line with said cap when the projectile is being rotated in flight.

5. In a fuse for projectiles, the combination of a loosely-seated hammer having a firing-pin arranged near its outer periphery, an anvil having an interrupted groove in its face, a detonator-cap situated on one side of the

interruption in the groove, a spring having one end secured on the opposite side of the interruption and its free end so arranged that the firing-pin will be maintained on said opposite side of said interruption until the shell is rotated in its flight, and powder-trains communicating with the reinforce-powder chamber.

In testimony whereof we affix our signatures in the presence of two witnesses.

GEORGE M. HATHAWAY.
CHARLES F. HATHAWAY.

Witnesses:
R. A. GENT,
R. G. GALLAGHER.