H. MAXIM.

FUSE FOR PROJECTILES.

APPLICATION FILED APR. 2, 1897.

907,158. Patented Dec. 22, 1908.

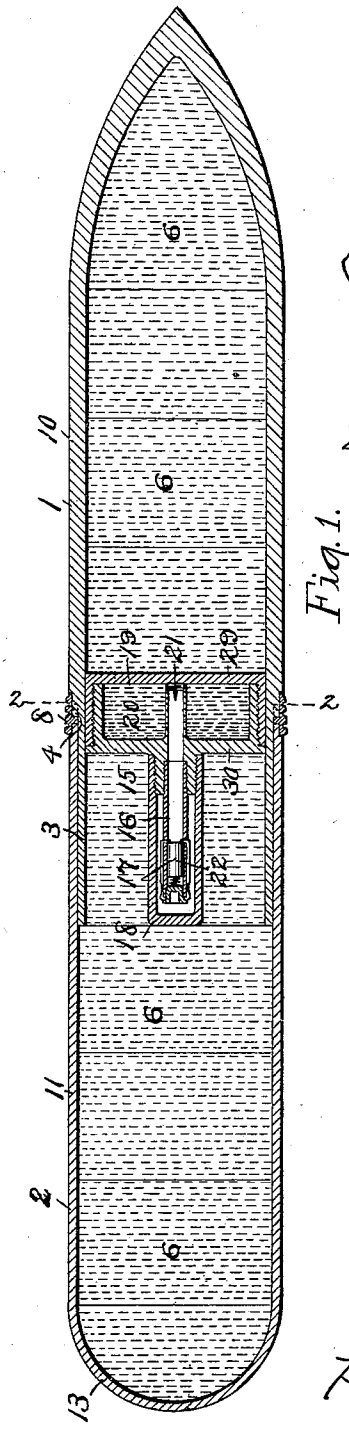


Fig. 1.

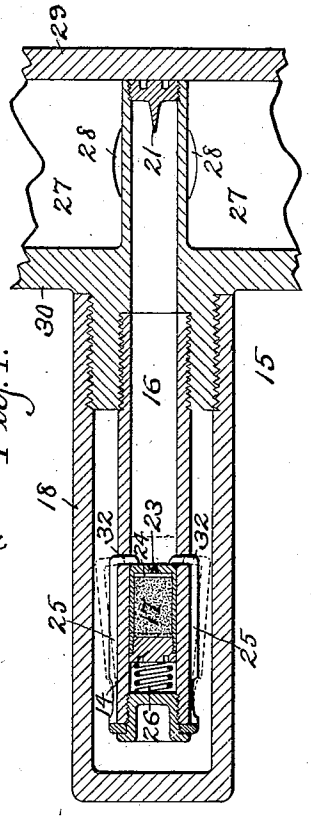


Fig. 3.

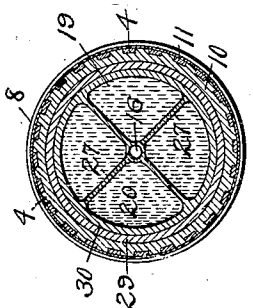


Fig. 2.

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UNITED STATES PATENT OFFICE.

HUDSON MAXIM, OF LONDON, ENGLAND.

FUSE FOR PROJECTILES.

No. 907,158. Specification of Letters Patent. Patented Dec. 22, 1908.

Application filed April 2, 1897. Serial No. 630,399.

To all whom it may concern:

Be it known that I, HUDSON MAXIM, a citizen of the United States of America, and residing at the city and county of London, England, have invented certain new and useful Improvements in Fuses for Projectiles, of which the following is a specification.

My invention relates to shell fuses and more particularly to that class of safety fuses wherein provision is made to protect the charge of the shell against premature or accidental explosion of the detonating material of the fuse.

The object of the invention is to provide a fuse of the character described which shall normally be inoperative to explode the charge of the shell even though the detonating material in the fuse should be accidentally exploded, but which shall, by the act of discharging the gun, be automatically rendered operative to explode the shell charge when the flight of the shell is arrested by impact with the target or otherwise.

With this object in view, the invention consists of a movable detonator, combined with a main explosive fuse charge, means retaining the detonator in a position of safety with respect to the main fuse charge, together with means releasing the detonator by the act of throwing the projectile from the gun.

Furthermore, the invention consists of certain details of construction and combination of parts hereinafter described and then specifically pointed out in the claims.

My inventive idea may receive various mechanical expressions, and I have shown one form which the invention may assume in the accompanying drawings, but it is to be understood that such drawings are for the purpose of illustration only and are not to be taken as defining the limits of the invention.

In said drawings Figure 1 is a longitudinal section of my improved fuse in place in a shell; Fig. 2 is a cross-sectional view on the line 2—2 of Fig. 1; and Fig. 3 is an enlarged sectional view of the fuse.

In the drawings I have shown the fuse as inclosed in shell composed of a forward section 1, and a rearward section 2, united by a telescopic joint 3, and provided with a suitable driving ring 4. The shell may be charged with any suitable explosive, here shown as compressed wet gun cotton 6, placed both forward of and to the rear of the fuse 15, thus preferably locating the fuse centrally within the shell, that is to say at the point surrounded by the driving ring 4.

The guide tube, 16, containing the plunger fuse body, 17, of detonative material, is surrounded by an exterior tube or chamber, 18, providing an air space about the body of the detonative material, the whole being surrounded by the body of compressed wet guncotton, 6, with which the shell is filled. It will be seen that the guide tube 16 is entirely closed throughout its extent, so that, in case of premature or accidental explosion of the detonative material 17 in the rear end of the tube 16, the flame could not be communicated to the dry gun-cotton in chamber 19, nor would the shock of explosion be directly communicated to the walls of the chamber 18. The function of the exterior chamber or air space intervening, between the detonative material and the body of wet guncotton is to provide a free space into which the detonative charge, 17, may expend or exhaust itself to such an extent that, after disrupting its containing tube and expanding into the outer chamber, it will, even if it then disrupts the walls of the outer tube or outer chamber, not possess sufficient detonative power to explode the surrounding wet guncotton. This arrangement effectually provides against any danger from premature explosion of the detonative charge.

At the forward portion of the fuse, and within a chamber, 19, preferably located at about the point encircled by the driving ring, is contained a priming charge of compressed dry guncotton, 20, and the tube or guide, 16, within and through which the plunger fuse body, 17, of detonative compound passes, is made to enter the chamber containing the dry guncotton, in such wise that, upon the striking of the projectile upon a resisting object, retarding its motion, the plunger body of detonative compound will fly forward into the chamber containing the dry guncotton, 20, where it strikes and is detonated by the pin, 21, detonating also the dry guncotton, which, in turn, detonates the entire mass of wet guncotton, 6. The plunger body, 17, of detonative substance preferably consists of a fulminate compound described in my United States Patent No. 529334. The capsule 22, containing the plunger body of detonative fulminate compound is provided at its forward portion with a percussion cap 23, and under the percussion cap, and between the same and the body of the fulminate com-

pound, is preferably interposed a layer or body of dry guncotton 24, the flash of which, from the explosion of the percussion cap, secures a more violent and effective detonation of the fulminate compound.

The capsule or container 22, for the body of fulminate compound is made sufficiently strong to resist the shock of the propelling powder charge, that is to say, the shock of initial acceleration of the projectile; and the fulminate container is held in place and prevented from moving forward toward the chamber 19, containing the dry guncotton, by means of strong longitudinal flat springs, 25, with tongues 32, projecting into the guide tube 16, bearing upon the forward end of the said container and arranged to hold it firmly in position, and absolutely to prevent its dislodgment by any handling of the projectile, however roughly, prior to its being thrown from the gun. The said springs are arranged and adapted to release the fulminate container only by centrifugal force due to the rapid rotation of the projectile shell, effected by its passage through the bore of the gun. See dotted lines in Fig. 3. At the rear of the body of fulminate compound is provided a spiral spring 26, or other suitable device, by which, upon the receding of the retaining springs 25, by the rotation of the shell, the plunger body of fulminate compound will be forced slightly forward, and the return of the retaining springs prevented, until the shell strikes some object of resistance, thus permitting the plunger body of detonative compound to then move freely forward toward and into the chamber containing the dry guncotton, to explode the projectile. The container may be provided with a weighted rear end, 14, to increase the force of the impact of the percussion cap, 23, on the pin, 21.

The chamber containing the dry guncotton is preferably constructed with partitions, 27, crossing it at right angles to each other, thus dividing the chamber into four or more parts or spaces, into each of which may be placed a body of dry guncotton. This arrangement of partitions effectually prevents the rotation of the projectile about the dry guncotton, and the ignition of it by friction due to the rapid rotation of the shell in its flight from the gun. The said walls or partitions furthermore serve the purpose of supporting or strengthening the walls of the shell at the point encircled by the driving ring, thereby permitting greater pressure to be employed to shrink the driving ring upon the shell. These partitions, 27, serve to further strengthen the shell in this region, to resist penetration of a quick-firing gun shell which might accidentally strike the projectile in this region, and the strong lateral walls further serve a useful purpose in slightly resisting disruption, or serving in a slight degree as tamping of the dry guncotton, and thereby directing more strongly the force of its explosion or detonative influence to the wet guncotton, 6, located at front and rear of the dry guncotton chamber. A portion, 28, of each cross partition or web is cut away from the guide tube 16 near the center of the dry guncotton chamber, so that less force will be required to break down the walls of the guide tube and to effect the detonation of the dry guncotton.

The chamber containing the dry guncotton is preferably separated from the body of wet guncotton, at both front and rear, by strong partitions, 29 and 30, the rearward wall or partition, 30, being, preferably, the stronger and thicker, to effectually resist disruption from any accidental explosion of the body of fulminate compound at the rear of it, and the consequent accidental ignition or firing by it of the dry guncotton, thus securely providing that, in order to ignite the dry guncotton, the body of fulminate compound must necessarily pass forward through the said rear wall of the guncotton chamber before its explosion would be able to ignite the dry guncotton charge.

While I have herein shown my improved fuse as centrally located within the bursting charge of the shell, it is not to be understood that my invention is limited to a fuse thus located, as I may advantageously place it in other positions with relation to the shell or its contained charge without in the least departing from the spirit of my invention.

What I claim is:

1. In a fuse, a chamber containing the main fuse charge, a second chamber, a primary charge, a closed guide tube lying partly within each of the two chambers and having the primary charge in the part within the second chamber, and retaining means moved upon the discharge of the gun to release the primary charge.

2. The combination with an explosive shell, of a detonative fuse consisting of a main or priming chamber having a firing pin and a charge of explosive material therein with a central passage or opening into the body of said charge, a second chamber, a detonative body supported in a closed guide tube connecting said chambers.

3. In combination with a projectile, a fuse consisting of a movable body of detonative compound and a fixed body of detonative compound positioned forward of the said movable body, a closed guide tube within which said movable body is located, the said movable body being adapted to move forward in said tube to the said fixed body and to be detonated therein.

4. In a fuse for a projectile, the combination of a detonative compound carried in a suitable capsule which is contained in a shell or casing, with a second shell or casing inclosing the first and forming an expansion

space between the two casings to receive the gases of explosion upon a premature explosion of said compound.

5. A shell fuse consisting of a fuse casing divided into two chambers, a closed guide tube extending into both of said chambers, a large mass of detonative material in one chamber and a small plunger body of detonative material detachably secured in that portion of the guide tube lying within the other chamber.

6. In a fuse, the combination of a movable detonative compound container, a tube to guide the said container in its movement, one or more stops retaining the said container in its normal position, and a spring adapted to move the said container forward on its release by the said stops, whereby the container is freed from the stops and can move forward in the guide tube when the projectile strikes the target.

7. In a fuse, the combination of a movable detonator, a main explosive charge, and means retaining the detonator in a rearward position of safety with respect to the main explosive charge but releasing the detonator by the act of throwing the projectile from the gun, together with means advancing the detonator toward the main explosive charge when the gun is fired, whereby the container is freed from the stops and can move forward in the guide tube when the projectile strikes the target.

8. In a fuse, the combination of a main explosive charge, a guide tube whose forward end is approximated to said charge, a plunger body of detonative material in the rear portion of said tube, a spring tending to advance said plunger body in said tube and towards said main charge, and centrifugally released retaining devices holding said plunger body against the tension of the spring till the gun is fired.

9. In a fuse, a chamber containing the main fuse charge, a second chamber, a primary charge, a closed guide tube lying partly within each of the two chambers, and having the primary charge in the part within the second chamber, and retaining means for the primary charge adapted to release the same upon the discharge of the gun.

In witness whereof I have hereunto signed my name in the presence of two witnesses.

HUDSON MAXIM.

Witnesses:
W. H. GRAHAM,
A. L. DURBAN.