S. G. MALBY.

IMPACT FUSE.

APPLICATION FILED NOV. 16, 1918.

1,424,112.

Patented July 25, 1922.

2 SHEETS—SHEET 1.

Fig. 1

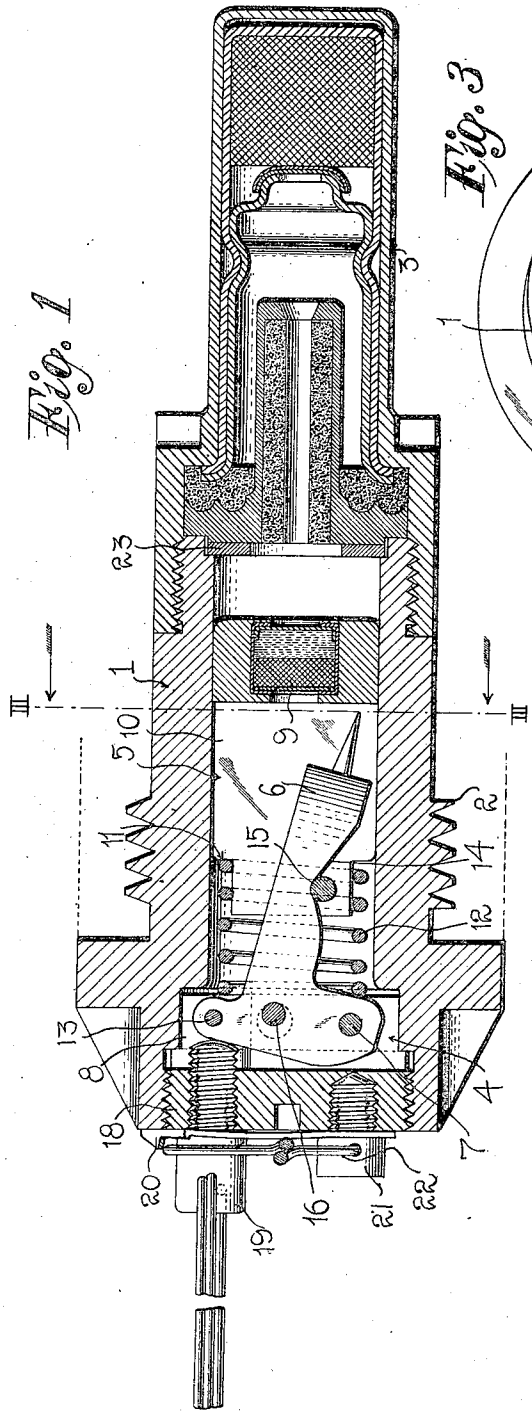


Fig. 3

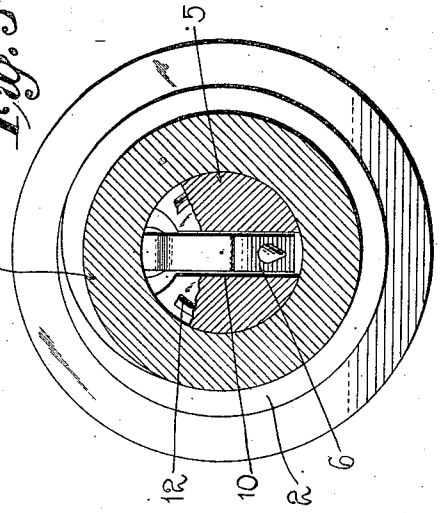


Fig. 4

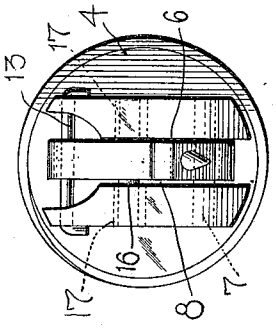


Fig. 5

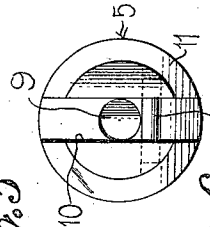


Fig. 6



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2 SHEETS—SHEET 2.

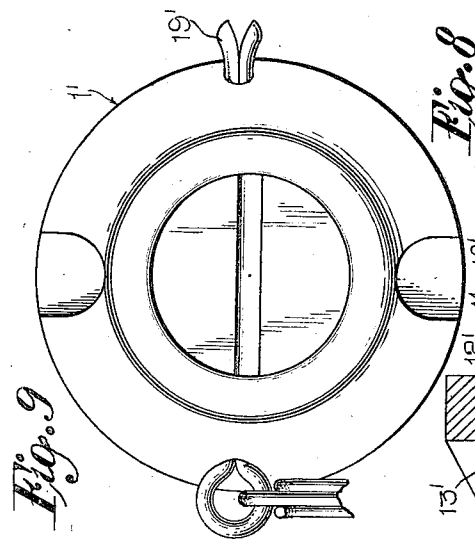


Fig. 9

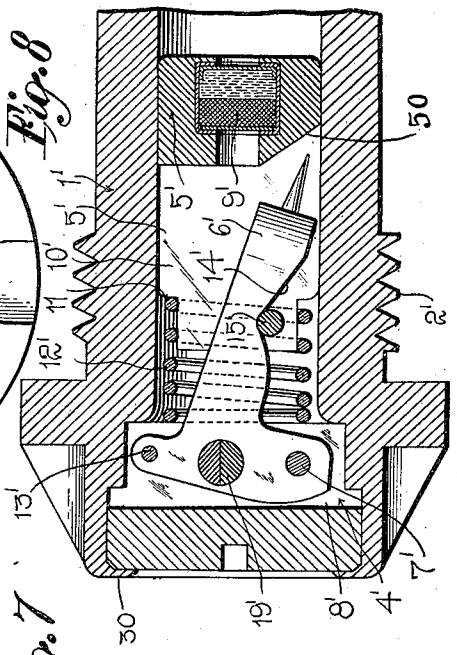


Fig. 8

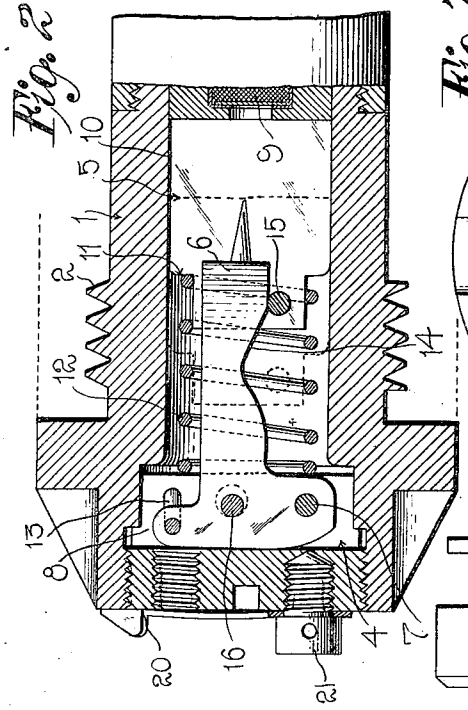


Fig. 2

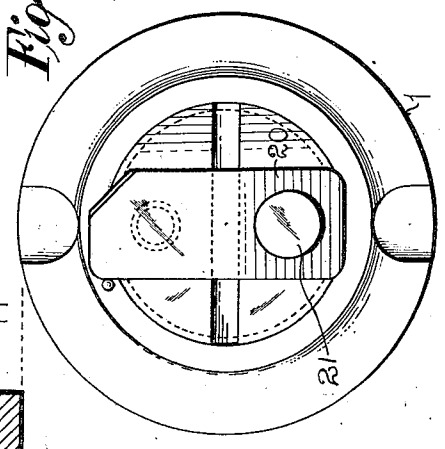


Fig. 7

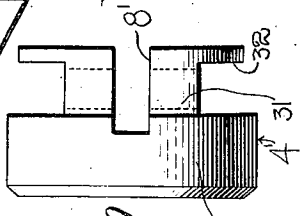


Fig. 10

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UNITED STATES PATENT OFFICE.

SETH G. MALBY, OF THE UNITED STATES ARMY, ASSIGNOR TO SECRETARY OF WAR OF THE UNITED STATES OF AMERICA, TRUSTEE.

IMPACT FUSE.

1,424,112. Specification of Letters Patent. Patented July 25, 1922.

Application filed November 16, 1918. Serial No. 262,892.

(FILED UNDER THE ACT OF MARCH 3, 1883, 22 STAT. L., 625.)

To all whom it may concern:

Be it known that I, SETH G. MALBY, captain Ordnance Department, United States Army, a citizen of the United States, stationed at Washington, District of Columbia, have invented an Improvement in Impact Fuses, of which the following is a specification.

The invention described herein may be used by the Government, or any of its officers or employees in prosecution of work for the Government, or by any other person in the United States, without payment of any royalty thereon.

This invention relates to certain improvements in impact fuses for projectiles and has for one of its objects the construction of a fuse wherein the firing pin and priming cap or other igniter are normally out of alinement and held in such relative position as to require the shock of the "set back" or inertia incident to the explosion of firing the gun to bring the parts into alinement and operative relation with each other.

Another object of the invention is the provision of a locking or holding means to maintain the firing pin in operative position as soon as it has been forced thereto by the movement of the projectile.

A further object is to provide a fuse in which the parts, normally in unarmed relation, are moved to armed relation without the utilization of centrifugal force.

Another object of the invention is the provision of a fuse that is secure against accidental discharge, simple in construction, positive and sensitive in action, and that is also safe during the usual handling incident to transportation and storage of explosives.

With these and other objects in view, which will become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts, hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which like reference characters indicate similar parts throughout the several figures.

In the accompanying drawings, forming a part of this specification:

Fig. 1 is a sectional elevation taken on the longitudinal axis of the fuse showing the parts in normal unarmed or safe position;

Fig. 2 is a partial similar section showing the firing pin and igniter cap in armed relation;

Fig. 3 is a section on line III—III of Fig. 1 looking in the direction of the arrows;

Fig. 4 is an end view of the firing pin block;

Fig. 5 is a similar view of the percussion pellet;

Fig. 6 is a perspective view showing the shape of the deformable pin as assumed when the device is in armed position.

Fig. 7 is a plan view of the fuse after the safety screw has been removed;

Fig. 8 is a sectional elevation of a part of a fuse showing a modified construction utilizing the invention;

Fig. 9 is a plan view of this modified construction; and

Fig. 10 is a detail of the same showing the closing cap.

In the embodiment of the invention shown in Figs. 1 to 7, inclusive, the fuse consists of a hollow, cylindrical stock or body 1, externally threaded as at 2, for securement to the casing of a shell or other projectile. A detonator arrangement, indicated generally by the numeral 3, of any desired form, is secured to the inner end of the stock. The longitudinal opening of the stock 1 houses the firing mechanism consisting of firing pin block 4 and percussion pellet 5. Block 4 is fixed and located in the outer end of the body. The firing pin 6 is of angular shape, in the preferred embodiment shown being T shaped, and is pivoted to the pin or rod 7, secured to the block and swings in a transverse slot 8 therein. The percussion pellet 5 slides in the stock and carries the primer cap 9 centrally at its inner end. The forward end of the pellet is transversely slotted as at 10, forming a fork, so as to permit the inner end of the firing pin 6 to swing into and out of alinement with the cap 9. A circumferential groove on the extended forward end of the pellet provides a shoulder 11 for one end of the light creep spring 12, surrounding the stem of the firing pin, and the other end of which rests against the block 4.

The parts are normally maintained in the position shown in Fig. 1, by means of the deformable pin 13 of aluminum or other

soft metal. This pin has its ends secured in the block 4, as shown in Fig. 4 and extends across the slot 8 and through the pin 6 at the forward end thereof, transversely opposite to the pivot 7.

One edge of the stem or shank of the T shaped firing pin 6 is provided with a V shaped cam surface shown at 14. Normally, the notch of the V rests on a pin 15 carried by the pellet 5, near its forward end and extending across the slot thereof. The purpose of this arrangement will be hereinfter explained.

Another transverse pin 16 is secured to the firing pin at the junction of the head and stem, and coacts with holes 17 in the block 4, which holes are of slightly larger diameter than the pin 16 to limit the movement of the firing pin on its pivot.

The outer end of the stock or body is closed by a cap piece 18, screw threaded into the same. The safety pin 19 screwed through the closing cap, secures the firing pin in safety position, by abutting the head of the same at about the point of the deformable pin 13. The cap is further provided with a resilient metal cover 20, pivoted to the screw 21, so that when the safety pin 19 is removed, the cover can be swung over the hole in the cap to prevent the entrance of dirt and other foreign deleterious matter. (See Fig. 7.)

The operation is as follows: The fuse being in normal position as shown in Fig. 1, is unarmed and safe as the point of the firing pin 6 can not under any circumstances, puncture the cap 9, being out of alinement therewith. The safety pin 19 is removed after breaking the sealing wire 22 and the cover 20 is turned to close the hole left in the cap 18.

On firing the projectile provided with the fuse, the shock of "set back" or inertia causes the percussion pellet 5 to slide backward toward the detonator 3 against the lead washer or pellet stop 23. In moving backward the pin 15, bearing against the V shaped cam surface of the pin 6, causes the firing pin to swing on its pivot, deforming the soft metal pin 13, so that the latter assumes a stirrup shape as shown in Fig. 6. The block 4, it will be noticed in Fig. 4, is cut away at each side of slot 8, for the purpose of permitting the bending of the pin 13.

The shape of the surface 14 and the position of the pin 15 is such that when the pellet has moved clear back, the point of the firing pin will be just off the longitudinal axis of the fuse, and in line with the cap 9, so that on impact of the projectile the pellet will be hurled forward against the force of the spring 12, as shown in dotted lines of Fig. 2, and the firing pin puncturing the cap 9 will ignite the same, and cause the firing of the charge of the detonator.

By making the pin 13 merely deformable and not of so small a diameter as to shear when the firing pin is forced into armed position, a locking arrangement is obtained to prevent dislodgment of the pin and so maintain the fuse armed when once the projectile has been fired.

In the modification disclosed in Figs. 8, 9 and 10, the pellet 5′ is provided with an undercut portion 50 at the inner end of slot 10′ so that in the normal position of the parts, the point of the firing pin 6′ will lie therein. The closing cap and firing pin block are formed as a single integral member as shown in Fig. 10, and this member is secured in position by spinning over the adjacent circumferential edge of the fuse body, as at 30. In this form the fuse is secured in safe condition by means of a split safety pin 19′, which extends clear through alined openings in the fuse body 1′, closing cap 18′ and firing pin 6′. The hole in the cap 18′ is shown in Fig. 10 at 31, and in that view there is clearly illustrated the shoulder 32, which prevents any dirt or mud, which may happen to be forced through the hole when the safety pin is removed, from reaching the interior of the fuse and preventing actuation of the same.

After removal of the safety pin 19′, the operation of this form of the invention is the same as that previously described.

The operation of a fuse embodying the invention being entirely independent of the action of centrifugal force, due to the rotation of the shell on its axis, fuses made in accordance with it can be used in projectiles fired from mortars or other devices, not provided with rifling, the only requirement being that there be an initial shock of firing.

Though the form of fuses illustrated are of that class known as point fuses, it will be obvious that the invention is equally applicable to base fuses as well.

What I claim as new and desire to secure by Letters Patent is:

1. A fuse for projectiles, having in combination a movable member carrying a primer cap, a pivoted firing pin normally out of alinement with the cap, and means carried by the movable member and cooperating with the firing pin on the forward movement of the projectile and independent of the rotation thereof, to bring the firing pin and cap into operative relation.

2. A fuse for projectiles comprising a movable percussion pellet carrying a primer, a pivotally mounted firing pin normally held with its point out of alinement with the primer, and means carried by the pellet and cooperating with the firing pin on the forward movement of the projectile and independent of the rotation thereof, for shifting the pin into alinement with the primer.

3. A fuse for projectiles, comprising a

hollow stock, a fixed firing pin block and a movable percussion pellet with a primer cap in the stock, a firing pin pivoted to the block normally held out of alinement with the cap, and means carried by the pellet and cooperating with the firing pin on the forward movement of the projectile and independent of its rotation, to move the firing pin into operative relation with the cap.

4. A fuse for projectiles, comprising a hollow stock, firing mechanism consisting of two members one fixed and the other movable in the stock, an igniter cap in the movable member, a firing pin pivoted to the fixed member and normally out of alinement with the cap, and means carried by the movable member and cooperating with the firing pin on the forward movement of the projectile and independent of its rotation, to move the firing pin into operative relation with the cap.

5. A firing mechanism for projectile fuses, comprising fixed and movable members, an igniter cap in the movable member, a firing pin pivoted to the fixed member and normally out of alinement with the cap, and means carried by the movable member and cooperating with the firing pin on the forward movement of the fuse and independent of its rotation, to move the firing pin into operative relation with the cap.

6. A fuse for projectiles, having in combination a longitudinally movable member carrying a primer cap, a pivoted firing pin normally out of alinement with the cap, and means carried by the movable member and cooperating with the firing pin on the forward movement of the projectile and independent of the rotation thereof, to bring the firing pin and cap into operative relation.

7. A fuse for projectiles comprising a longitudinally movable percussion pellet carrying a primer, a pivotally mounted firing pin normally held with its point out of alinement with the primer, and means carried by the pellet and cooperating with the firing pin on the forward movement of the projectile and independent of the rotation thereof, for shifting the pin into alinement with the primer.

8. A fuse for projectiles, comprising a hollow stock, a fixed firing pin block and a longitudinally movable percussion pellet with a primer cap in the stock, a firing pin pivoted to the block normally held out of alinement with the cap, and means carried by the pellet and cooperating with the firing pin on the forward movement of the projectile and independent of its rotation, to move the firing pin into operative relation with the cap.

9. A fuse for projectiles, comprising a hollow stock, firing mechanism consisting of two members one fixed and the other longitudinally movable in the stock, an igniter cap in the movable member, a firing pin pivoted to the fixed member and normally out of alinement with the cap, and means carried by the movable member and cooperating with the firing pin on the forward movement of the projectile and independent of its rotation, to move the firing pin into operative relation with the cap.

10. A firing mechanism for projectile fuses, comprising fixed and longitudinally movable members, an igniter cap in the movable member, a firing pin pivoted to the fixed member and normally out of alinement with the cap, and means carried by the movable member and cooperating with the firing pin on the forward movement of the fuse and independent of its rotation, to move the firing pin into operative relation with the cap.

11. A fuse for projectiles comprising a pivoted firing pin with a cam surface on the shank thereof, a movable member carrying a primer cap and means on the member cooperating with the cam surface of the firing pin to arm the fuse on the forward movement of the projectile independent of its rotation.

12. A fuse for projectiles, comprising fixed and movable members, a primer cap carried by the movable member in the axis of the fuse, a firing pin pivoted to the fixed member normally out of alinement with the cap and movable transversely of the fuse axis, and means carried by the movable member and cooperating with the firing pin on the forward movement of the projectile and independent of its rotation to shift the firing pin into operative relation with the cap.

13. A fuse for projectiles having in combination a movable member carrying a primer cap, a pivoted firing pin normally out of alinement with the cap, and means carried by the movable member and cooperating with the firing pin on the forward movement of the projectile and independent of the rotation thereof, to bring the firing pin and cap into operative relation and maintain the fuse in armed position.

14. In a fuse for projectiles, firing mechanism comprising fixed and movable members, a primer cap in the movable member, a firing pin pivoted to the fixed member and normally out of alinement with the cap, and a cam surface on one of the members cooperating with the pin on the other member to arm the fuse by shifting the firing pin into alignment with the cap, on the forward movement of the projectile independent of its rotation.

15. A fuse for projectiles comprising a pivoted firing pin with a cam surface on the shank thereof, a movable member carrying a primer cap, a pin on the member cooperating with the cam surface of the firing pin to arm the fuse on the forward move-

ment of the projectile independent of its rotation, and means to maintain the fuse in safe condition during transportation and storage.

16. A fuse for projectiles having in combination a movable member carrying a primer cap, a pivoted firing pin normally out of alinement with the cap, means carried by the movable member and cooperating with the firing pin on the forward movement of the projectile and independent of the rotation thereof to bring the firing pin and cap into operative relation and retain the fuse in armed position. and means to maintain the fuse in safe condition during transportation and storage.

17. In a fuse for projectiles, firing mechanism comprising fixed and movable members, a primer cap in the movable member, a firing pin pivoted to the fixed member and normally out of alinement with the cap, a cam surface on one of the members cooperating with the pin on the other to arm the fuse by shifting the firing pin into alinement with the cap on the forward movement of the projectile independent of its rotation, means to maintain the fuse in safe condition during transportation and storage, and means to prevent the entrance of deleterious matter into the body of the fuse when the safety means is removed.

18. A fuse for projectiles, including a movable percussion pellet carrying a primer and a pivotally mounted firing pin normally held with its pin out of alinement with the primer, the pellet and pin cooperating upon movement of the pellet in one direction to bring the firing pin and primer into operative relation.

19. A fuse for projectiles, including a movable percussion pellet carrying a primer and a pivotally mounted firing pin normally held with its pin out of alinement with the primer, the pellet and pin cooperating upon rectilinear movement of the pellet in one direction to shift the pin into alinement with the primer.

20. A fuse for projectiles, including a movable percussion pellet, carrying a primer, a pivotally mounted firing pin normally held with its pin out of alinement with the primer, the pellet and pin cooperating upon movement of the pellet in one direction to shift the pin into alinement with the primer and means for locking the pin in its shifted position.

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