E. R. STUART.

SENSITIVE PERCUSSION FUSE.

APPLICATION FILED MAY 6, 1916.

1,229,669.

Patented June 12, 1917

Fig. 1,

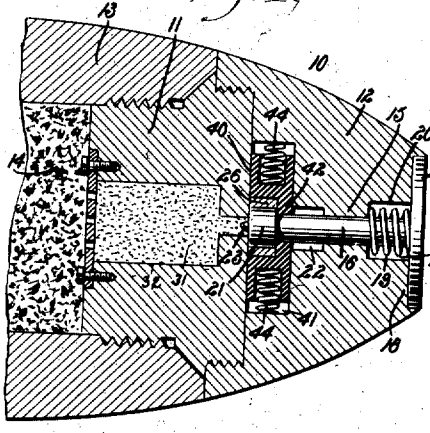


Fig. 3,

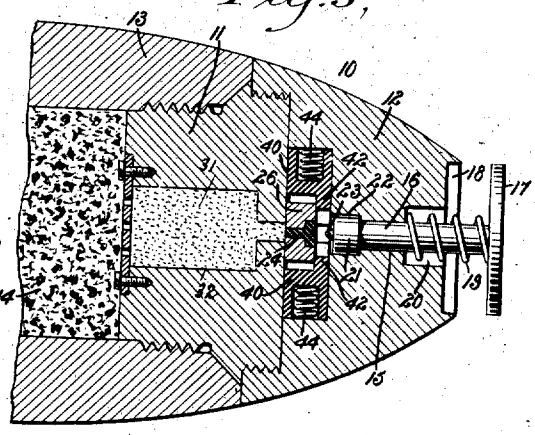


Fig. 2,

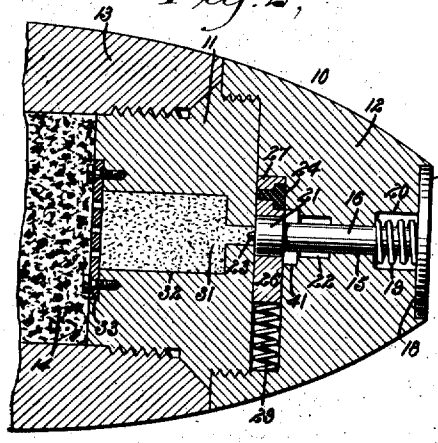


Fig. 4,

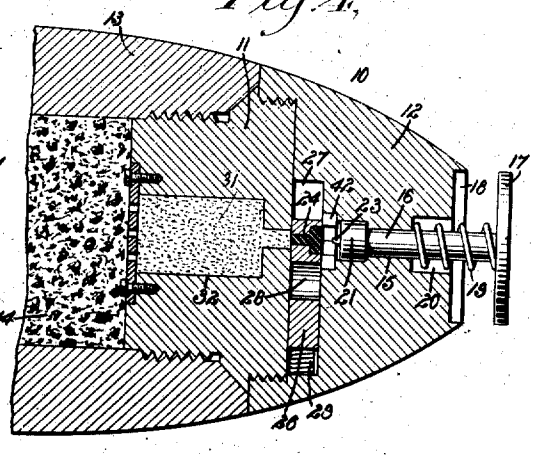


Fig. 5,

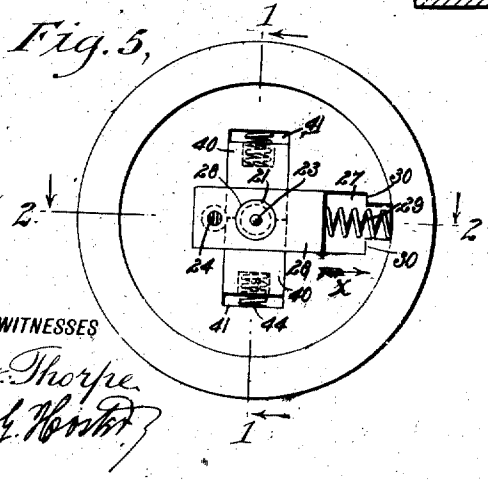


Fig. 6,

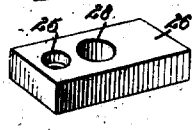
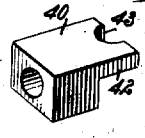


Fig. 7.



WITNESSES

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UNITED STATES PATENT OFFICE.

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SENSITIVE PERCUSSION-FUSE.

1,229,669. Specification of Letters Patent. Patented June 12, 1917.

Application filed May 6, 1916. Serial No. 95,815.

To all whom it may concern:

Be it known that I, EDWIN R. STUART, United States Army, and at present a resident of West Point, in the county of Orange and State of New York, have invented a new and Improved Sensitive Percussion-Fuse, of which the following is a full, clear, and exact description.

The invention relates to fuses for the explosion of a projectile fired from a gun.

The object of the invention is to provide a new and improved sensitive percussion fuse arranged to permit of securely setting and locking the fuse to prevent the detonation of a shell or a projectile prior to firing the gun, to unlock the fuse through the rotating action of the projectile after being fired in the gun, and to cause an explosion of the projectile whenever the fuse meets a resistance however slight, such, for instance, as striking a small strut or a similar part of an aeroplane or the envelop of a dirigible.

In order to accomplish the desired result, use is made of a firing device and a fulminate carrier normally out of striking position relative to the firing device and capable of moving into striking position relative to the striking device by centrifugal force on the revolving of the projectile.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the sensitive percussion fuse as applied and with the parts in unarmed position prior to firing a shell or projectile, the section being on the line 1—1 of Fig. 5;

Fig. 2 is a sectional plan view of the same on the line 2—2 of Fig. 5;

Fig. 3 is a sectional side elevation of the same with the parts in released armed position and after the projectile is fired and in flight;

Fig. 4 is a sectional plan view of the same;

Fig. 5 is a rear face view of the outer part of the body or housing of the fuse;

Fig. 6 is a perspective view of the fulminate carrier; and

Fig. 7 is a similar view of one of the locking blocks for the firing pin.

The body 10 of the sensitive percussion fuse is preferably made in two parts 11 and 12 screwed together, and of which the rear or base part 11 screws into the front end of the projectile 13 containing the usual explosive charge 14 for bursting the projectile when the target is reached. The forward part 12 of the body of the housing 10 is provided with a central bore 15, in which is mounted to slide a firing pin 16 provided at its forward end with a head 17, preferably in the form of a disk, which may be perforated to offer as little resistance as possible to the air. The head 17 is adapted to be seated in a recess 18 formed on the forward end of the body part 12, and the said head 17 is pressed on by a spring 19, preferably coiled around the forward end of the firing pin 16 and seated in an enlarged bore 20 formed in the body part 12 and concentric with the bore 15.

The inner end of the firing pin 16 is provided with a collar 21 adapted to pass into an enlarged bore 22 concentric with the bore 15 to limit the outward movement of the firing pin 16 whenever the latter passes into armed position, as shown in Figs. 3 and 4. The inner end of the firing pin 16 is provided with a point 23 adapted to strike the fulminate 24 held in an aperture 25 formed in a fulminate carrier 26, preferably in the form of a rectangular piece mounted to slide radially in a guideway 27 formed in the rear face of the body part 12.

The fulminate carrier 26 is provided to one side of the fulminate 24 with an aperture 28 into which fits the inner collared end 21 of the firing pin 16 to normally hold the fulminate carrier 26 in inactive position relative to the firing pin 16, that is, with the fulminate 24 out of the path of the point 23 of the firing pin 16, as will be readily understood by reference to Figs. 2 and 5. A spring 29 is seated in the guideway 27 and presses on one end of the carrier 26 to hold the latter normally in inactive non-armed position. The end of the carrier 26 pressed on by the spring 29 is heavier than the opposite end carrying the fulminate 24 so that when the projectile is fired and, by the rifling of the gun, is caused to rotate then the carrier 26 is caused to slide outward by centrifugal force against the tension of the spring 29 and moves into active armed position relative to the firing pin 16 after the latter has moved into outermost position and has released the car-

rier 26. This outward sliding movement of the carrier 26 in the direction of the arrow x is limited by shoulders 30 formed in the guideway 27 (see Fig. 5). When the carrier 26 moves into the active position mentioned then the fulminate 24 registers with the igniting charge 31 contained in a chamber 32 formed in the rear body part 11. The rear end of the chamber 32 is preferably closed by a perforated plate 33 to keep the igniting charge 31 separate from the explosive charge 14, but to ignite the explosive charge whenever the igniting charge 31 is set off by the fulminate 24, as hereinafter more fully explained.

The firing pin 16 is normally locked in retracted inactive position and for this purpose use is made of a locking device having locking blocks 40 mounted to slide radially in a guideway 41 formed on the rear face of the body part 12 and standing preferably at a right angle to the guideway 27 and intersecting the same, as plainly indicated in Fig. 5. The locking blocks 40 are provided with necks 42 having recesses 43 to engage the firing pin 16 in front of the collar 21 so as to lock the firing pin 16 in the retracted position shown in Figs. 1 and 2. The locking blocks 40 are pressed on by springs 44 seated in the outer ends of the guideway 41 to hold the blocks 40 normally in innermost locking position. The springs 44 are of sufficient strength so that their tension is readily overcome by the outward movement of the blocks 40 due to centrifugal force on rotating the shell or projectile 13, as previously explained. From the foregoing it will be seen that by the arrangement described the firing pin 16 is normally locked in retracted inactive position by the locking blocks 40, and the firing pin 16 in turn locks the fulminate carrier 26 in inactive position although the fulminate carrier 26 may be held in this inactive position by the action of its spring 29 in case the firing pin 16 should accidentally move outwardly into the position shown in Figs. 3 and 4. Thus the fulminate 24 is normally out of the path of the firing pin 16 and the shell or projectile can be safely handled in any form or manner whatever without danger of the fuse accidentally setting off the charge 31.

The operation of the fuse is as follows:

Presuming that the fuse parts are in normal inactive unarmed position as shown in Figs. 1, 2 and 5, and the projectile to which the fuse is attached is fired from the gun, then the projectile is accelerated at all points of its travel within the gun and at the same time has impressed upon it a high velocity of rotation by the rifling of the gun. As soon as the acceleration of the projectile ceases at or near the muzzle of the gun, the moving parts of the fuse are free to move under the influence of the centrifugal force developed by the rotation of the projectile and its attached fuse. Under this influence the locking blocks 40 move radially outward thereby pressing the springs 44 and disengaging the necks 42 from the collar 21 thus releasing the firing pin 16. The latter is now caused to slide forward under the action of its spring 19. The forward movement of the firing pin 16 is limited by the collar 21 striking the forward end wall of the bore 22 and when the firing pin 16 reaches this position its head 17 is projected a distance beyond the front end of the fuse body part 12, as plainly shown in Figs. 2 and 4. The forward movement of the firing pin 16 unlocks the fulminate carrier 26 and the latter is now free to move radially in the direction of the arrow x under the influence of the rotation of the projectile and against the spring 29 until the outward movement of the carrier 26 is stopped by its striking the shoulders 30. When the carrier 26 reaches this position the fulminate 24 is now in register with the point 23 and with the reduced end of the chamber 32. If the head 17 of the firing pin 16 now meets with any resistance, even a slight one, then the firing pin is moved inwardly and its point 23 strikes the fulminate 24 and ignites the same thus causing the ignition of the charge 31 and a subsequent ignition of the explosive charge 14 to burst the shell or projectile 13. It will be noticed that by the arrangement described the fuse when in active position, that is, during the flight of the projectile, is readily set off by the head striking, for instance, a small strut or similar part of an aeroplane or the envelop of a dirigible.

It will also be noticed that the functioning of the fuse and the explosion of the projectile are caused by the exposed firing pin encountering any slight resistance and one that is insufficient to check the velocity of the projectile itself.

It is understood that as the locking blocks 40 are disposed on opposite sides of the axis of the shell or projectile they readily slide radially outwar. by centrifugal force on the rotation of the shell or projectile, and the prepondera ce of weight of the fulminate carrier 26 is next to its spring 29 so that the fulminate carrier 26 slides radially in the direction of the arrow x by centrifugal force on the rotation of the shell or projectile.

It is further understood that the spring 19 is of such strength that it will project the firing pin and hold it in the forward position against the resistance of the air during the flight of the projectile or shell. The strength of this spring is varied as may be required to accommodate its action to projectiles of different velocities, so that in all classes of ordnance the firing pin will be held in the forward position with as small a mar-

gin of strength as practicable. When the head of the firing pin meets a slightly greater resistance than that offered by the air, the firing pin is pushed rearward and fires the fulminate cap as above explained.

It is expressly understood that I do not limit myself to the detail construction disclosed as the same may be varied without departing from the spirit of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In a fuse for projectiles, a spring-pressed firing pin movable in the direction of the axis of the projectile, locking means normally locking the firing pin against outward movement and mounted to slide transversely by centrifugal force, and a fulminate carrier mounted to slide transversely by centrifugal force, the fulminate carrier being provided with an aperture at one side of the fulminate into which fits the inner end of the firing pin to normally lock the fulminate carrier against transverse movement.

2. In a fuse for projectiles, a firing pin slidable in the direction of the axis of the projectile, the firing pin having a collar at its inner end, a spring pressing the firing pin, a pair of blocks mounted to slide transversely and having necks at their inner ends engaging the said collar to hold the firing pin locked in retracted position against the tension of its spring, and a fulminate carrier mounted to slide transversely and provided with an aperture engaged by the inner end of the said firing pin to lock the carrier against movement until the firing pin is released by the said locking blocks.

3. In a fuse for projectiles, a firing pin slidable in the direction of the axis of the projectile, the firing pin having a collar at its inner end, a spring pressing the firing pin, a pair of blocks mounted to slide transversely and having necks at their inner ends engaging the said collar to hold the firing pin locked in retracted position against the tension of its spring, a fulminate carrier mounted to slide transversely and provided with an aperture engaged by the inner end of the said firing pin to lock the carrier against movement until the firing pin is released by the said locking blocks, and means to limit the sliding movement of the fulminate carrier to locate the fulminate in the path of the firing pin.

4. In a fuse for projectiles, a fuse body, a firing pin mounted on said fuse body and having a striking plate at its forward end, and automatic locking means normally locking the said firing pin in a retracted position in the said body, the said locking means being slidable in a direction transverse to the axis of the projectile and being adapted by centrifugal force, on the rotation of the projectile, to release the said firing pin, a spring for moving the firing pin forward when released to cause the striking plate to project beyond the general outline of the fuse body, and a laterally movable fulminate carrier for moving the fulminate into the path of the firing pin when the latter is released, whereby upon the impact of the projectile, the firing pin will be driven inward against the fulminate thereby detonating the fuse and projectile.

5. In a fuse for projectiles, a fuse body having a recess in its forward end, a firing pin mounted to slide in the fuse body and provided at its forward end with a head adapted to be seated in the said recess, automatic locking means normally locking the said firing pin in retracted position in the said body and adapted to be actuated during the flight of the projectile, to release the firing pin, means for moving the firing pin when released, to project its head beyond the fuse body, and a fulminate carrier having a fulminate adapted to be engaged by the firing pin when the latter is driven inward by contact of the projectile with the target.

6. In a fuse for projectiles, a fuse body provided with a central bore and with a recess at the outer end of the fuse body and into which leads the said central bore, a firing pin slidable in the said bore and having a head adapted to fit into the said recess, and automatic locking means normally locking the said firing pin in retracted position with the said head seated in the said recess.

7. In a fuse for projectiles, a fuse body provided with a central bore and with a recess at the outer end of the fuse body and into which leads the said central bore, a firing pin slidable in the said bore and having a head adapted to fit into the said recess, automatic locking means normally locking the said firing pin in retracted position with the said head seated in the said recess, the said locking means being adapted to release the said firing pin on being moved transversely by centrifugal force on the rotation of the projectile, and a spring pressing the said firing pin to move the latter outwardly on being released and to project the said head beyond the said body.

EDWIN R. STUART.