

F. A. SUTTON.
FUSE FOR PROJECTILES.
APPLICATION FILED OCT. 18, 1917.

1,393,585.

Patented Oct. 11, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

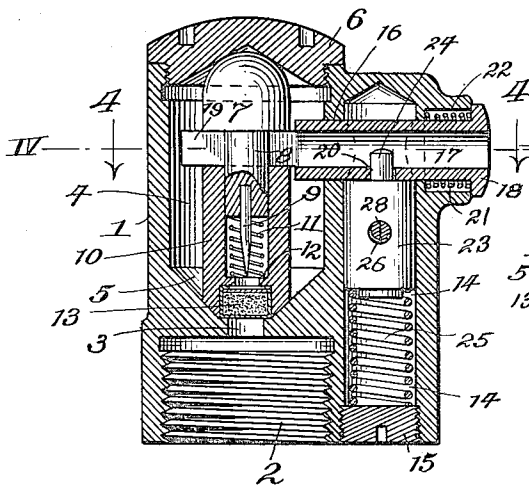


Fig. 2.

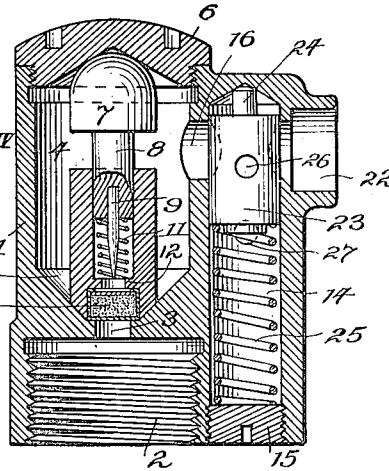


Fig. 3.

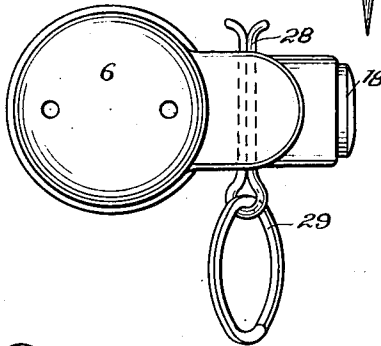
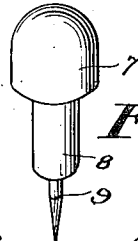


Fig. 5.

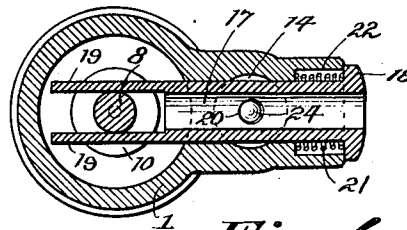


Fig. 4.

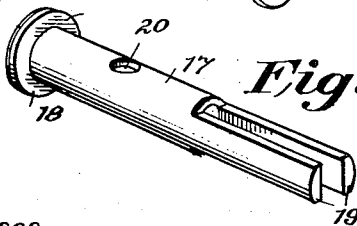


Fig. 6.

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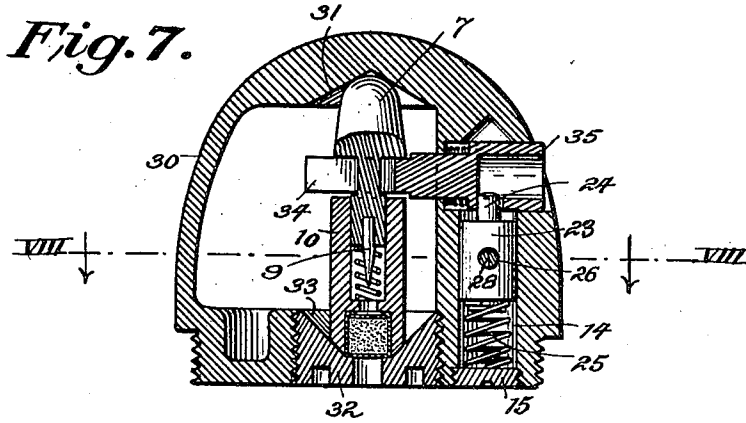
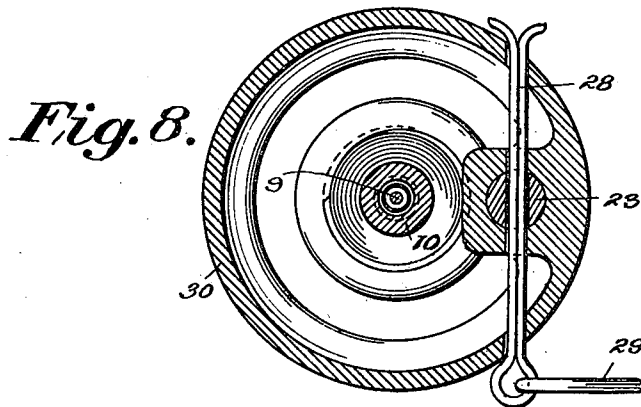
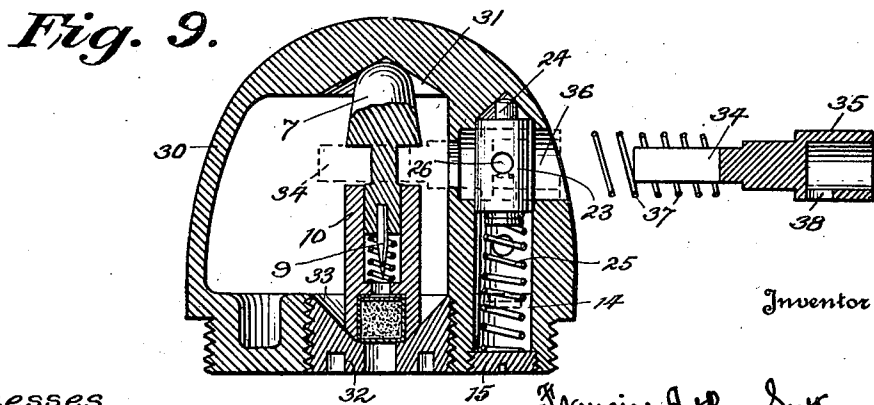
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2 SHEETS—SHEET 2.



Inventor:

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UNITED STATES PATENT OFFICE.

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FUSE FOR PROJECTILES.

1,393,585.

Specification of Letters Patent.

Patented Oct. 11, 1921.

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To all whom it may concern:

Be it known that I, FRANCIS ARTHUR SUTTON, a subject of the King of England, residing at Oakhurst, Ashford, in the county of Kent, England, have invented a certain new and useful Improvement in Fuses for Projectiles, of which the following is a specification.

My present invention has reference to an improved fuse for projectiles, which fuses are designed to cause an explosion of the projectile upon impact.

Among projectiles of this type are those which are thrown from trench mortars, and as they frequently fall on soft ground they become buried therein before they have time to explode.

For the sake of safety in handling such projectiles, and also to prevent premature explosion thereof in the gun, the projectiles are furnished with a locking device which retains the striker and is itself retained by a bolt or the like, which latter is released or set back by the shock of the discharge of the gun, whereby the locking device is released and is ejected from the projectile as the latter leaves the muzzle of the gun, so that the striker is free to act on impact, as required.

With the fuse now commonly employed a difficulty arises owing to the fact that the locking device or pin, on being ejected from the projectile, leaves a hole or opening through which mud or dirt is liable to enter, and the presence of which sometimes interferes with the striking mechanism, and the proper functioning of the percussion fuse. In this way many projectiles are rendered blind.

According to the present invention I arrange and form the retaining device for the striker-locking means above mentioned in such a way that said retaining device will form a cover or shutter and close the hole out of which the locking pin has escaped, and in this manner no mud or dirt can get at the striker mechanism, and therefore said mechanism is free to act, even if the projectile buries itself on striking the soft ground.

A convenient embodiment of my invention comprises a stirrup which engages and retains the striker in a transverse direction, and has a spring under compression tending

to eject the stirrup laterally through a hole in the casing of the projectile, or the fuse proper. The stirrup is retained by a bolt or shutter, capable of sliding at right angles to the stirrup and which is held in locking engagement therewith under the action of a spring. On the discharge of the gun, the combined bolt and shutter is set back against its spring sufficiently to release it from engagement with the stirrup. As the shell leaves the gun, the stirrup is ejected and the combined bolt and shutter move forwardly and close the opening left by the stirrup.

Several embodiments of the invention are shown in the annexed drawings, wherein:

Figure 1 is a vertical sectional elevation of a fuse designed to be screwed upon a threaded nipple extending from a projectile;

Fig. 2 a like view in which the stirrup or safety device for the striker has been ejected and the combined lock and shutter has moved upwardly to close the opening through which the stirrup was ejected;

Fig. 3 a top plan view of the structure;

Fig. 4 a transverse horizontal sectional view, taken on the line IV—IV of Fig. 1;

Fig. 5 a perspective view of the striker;

Fig. 6 a similar view of the stirrup;

Fig. 7 a vertical sectional view of a slightly modified form, wherein the fuse head is adapted to be screwed into a recess formed in the forward end of the shell;

Fig. 8 a transverse horizontal sectional view on the line VIII—VIII of Fig. 7; and

Fig. 9 a view similar to Fig. 7, showing the stirrup or locking device as ejected and the shutter closed.

Referring first to Figs. 1 to 6, 1 denotes the main body of the fuse, provided with a threaded opening 2 in its base, into which is adapted to be screwed the threaded nipple extending from the body of the shell, not shown. This opening communicates with the powder chamber of the shell, or the powder charge may be placed in such opening, and is in direct communication, through a smaller opening 3, with the enlarged chamber 4 formed in the upper part of the body 1 and adapted to contain the striking and detonating mechanism.

As will be seen upon reference to Figs. 1 and 2, the bottom wall 5 of the chamber 4 is inclined, and the cap piece 6, which is

screwed into the upper portion of the body 1 and forms a closure for the upper part of the chamber 4, is likewise coned upon its inner face.

5 The striker is shown in detail in Fig. 5, and comprises a round head 7, adapted to bear against the coned face of the cap-piece or closure 6, a cylindrical stem 8, and a fixed pin 9. Said cylindrical portion 8 extends
10 into the upper part of a cylindrical member 10, making a free fit therewith. The striker and the cylindrical member are normally held apart by a light spring 11, which surrounds the pin 9, and at its upper end bears
15 against the lower face of the stem 8, while the lower end of the spring bears upon an inwardly-projecting shoulder 12, formed in the member 10.

The detonator is indicated by 13, and is
20 seated within the lower end of the cylindrical member, in line with the pin 9 and overlying the opening 3 hereinbefore referred to.

With this construction, if the shell strikes head-on the striker will pass downwardly,
25 into the member 10, and cause the detonation of the detonator or cap 13. If the shell should strike upon its side, the coned face 5 and the coned face of the cap-piece 6 will cause the parts to function in the same way
30 and bring about an explosion of the shell. As above noted, however, it is essential for safety that until the shell has passed from the gun or motor the detonating mechanism be held inoperative. To this end I employ
35 the following mechanism: Located laterally of the chamber 4 and parallel thereto is a somewhat smaller chamber 14, said chamber terminating short of the fuse body and having its lower end closed by a screw plug 15.
40 A laterally-extending bore or chamber is formed in the body of the fuse, said bore being designated by 16 and passing directly through the chamber 14 and into the upper portion of the chamber 4. Through this
45 opening or bore 16 is introduced the locking pin or safety device, shown in detail in Fig. 6, and comprising a body portion 17, a head 18, and a pair of arms 19 which extend inwardly from the body portion. In other
50 words, the structure may be said to comprise a headed pin, the inner end of which is bifurcated or cut away, so as to form two arms, as 19. The body portion is likewise provided with an opening 20. The arms 19
55 of the pin, when the same is inserted in safety position, as shown in Fig. 1, pass beneath the head 7 and overlie the upper end of the cylindrical member 10, said arms straddling the cylindrical portion 8 of the
60 striker. A spring 21 encircles the locking pin and when the parts are in their assembled position, as in Figs. 1 and 4, the spring bears against the inner face of the head 18 and against the bottom wall of a cavity 22
65 formed in the side wall or projecting por-

tion of the body 1, and in line with the bore 16. In fact, it may be looked upon as an enlargement of said bore.

To retain the locking pin in place, I employ a setback device, comprising a cylindrical
70 block 23, the upper end of which is provided with a pin or lug 24 adapted, when the parts are in the positions shown in Fig. 1, to pass into the opening 20 and to thereby prevent outward movement of the locking
75 pin under the action of the spring 21. Said block 23 is urged upwardly by a spring 25, which bears against the lower end of the block and against the upper face of the screw-plug 15 which closes the lower end of
80 the chamber 14. Said block 23 is provided with a transverse opening 26 which, when the parts are in the positions shown in Fig. 1, is in alinement with openings 27 (Fig. 2)
85 formed in the side walls of the chamber 14, in order that the safety pin 28 may be passed therethrough. Said pin is preferably formed of wire so that it may be readily inserted and as readily withdrawn by pulling upon a
90 ring, as 29, attached to the pin. So long as this pin 28 is in position the block 23 is locked against any movement, and consequently the safety pin for the detonating
95 mechanism is held in its position and the striker is held against any contact with the detonator.

Prior to the loading of the shell into the gun, pin 28 is withdrawn, so that the setback block 23 may function. When the gun
100 is discharged, said member 23 will, owing to inertia, set back against the spring 25 and consequently the safety pin for the detonating mechanism is free to be moved outwardly or laterally through the action of the
105 spring 21. As soon as the projectile leaves the gun, it will be thrown outwardly by the spring and consequently the detonating mechanism will then be free to act either upon direct impact head on, or by lateral im-
110 pact, as above noted.

When the locking pin for the detonating mechanism is free of the fuse, the locking
set back block then moves upwardly under the action of its spring and closes the opening
115 through which the safety-pin has been ejected. In other words, this locking block performs a double function, that of a lock for the safety pin and as a shutter or closure for the opening through which the safety
120 pin is ejected.

In Figs. 7 to 9 inclusive there is shown a slight modification of the structure, though to all intents and purposes the operation is the same. In this case, the fuse-head, denoted by 30, is adapted to be screwed into a
125 threaded recess formed in the forward portion of the projectile. The fuse head is made hollow, and the upper inner wall thereof is provided with a coned surface 31, and a plug 32 screwed into the lower end of the
130

fuse-head 30 is likewise provided with a coned surface 33. The striker and detonating carrier are the same as in the other form, and are similarly lettered. A cylindrical bore or chamber 14 is present, as in the other case, and a set-back locking block 23 and pin 24 are likewise present. The safety locking device or pin takes a slightly different form, though in effect it is identical with that before described. Its inner end is bifurcated, forming two arms 34, adapted to straddle the cylindrical section of the striker, and to overlie the upper end of the cylindrical member 10. The safety pin is provided with a head 35, which passes into a recess or lateral bore 36, formed in the upper portion of the head 30 transverse to the chamber 14, and is normally urged outwardly by a spring 37 bearing against the head and the inner wall of the bore or chamber 36. The pin 24 of the set-back locking mechanism enters an opening 38 formed in the head 35 when the parts are in safety position, as shown in Fig. 7. The transverse pin 28 is employed as in the other case, to hold the parts positively against any movement whatsoever until the shell is about to be loaded into the gun or mortar.

As will be noted upon reference to the drawings, the set-back block 23 under both constructions herein described is of a diameter sufficient, when the same is moved upwardly, by its impelling spring, to absolutely close the lateral opening through which the safety pin is ejected, as the shell leaves the gun or mortar. Thus, even though the shell strike in mud or soft ground, the fuse will nevertheless function, which is frequently not the case where such opening is not closed, for the mud will be forced inwardly through such opening and in effect lock the detonating mechanism against operation.

It will at once be appreciated that the structure, while relatively simple of manufacture, may be safely handled.

Having thus described my invention, what I claim is:

1. A fuse for projectiles, comprising in combination a firing mechanism adapted to function upon impact of the projectile head-on, base-on or laterally; a safety device movable through an opening in the wall of the fuse for holding the firing mechanism in safe locked position; means independent of any rotative action of the projectile or fuse to withdraw said safety device, and to thereby release the firing mechanism; and a lock of the set-back type for holding said safety device normally in place and adapted, when the safety device is withdrawn, to close the opening through which it is moved.

2. A fuse for projectiles, comprising in combination a detonating mechanism; locking means for holding said mechanism in

safe condition; means for ejecting said locking means through an opening in the fuse as the projectile leaves the gun; and means for closing said opening.

3. A fuse for projectiles, comprising in combination a cap or fulminating charge; a striker adapted to detonate said cap upon impact of the projectile; a member normally holding said striker in inoperative position; means for urging said member outwardly through an opening in the fuse to free it therefrom; and locking means for said member, acting by set-back upon the firing of the projectile to release said holding member and to close the opening through which the holding member passes.

4. A fuse for projectiles, comprising in combination a cap or fulminating charge; a striker adapted to detonate the cap upon impact of the projectile; means to hold the striker in inoperative position; means for throwing said holding means outwardly from the fuse through an opening therein as the projectile leaves the gun; and locking means acting by set-back to normally release the holding means and to close the opening through which said holding means passes.

5. A fuse for projectiles, comprising in combination a striker adapted to function upon impact of the projectile in any direction; a safety device therefor extending laterally therefrom and in line with an opening in the fuse and through which the safety device may be introduced; a spring acting to withdraw and eject the safety device through such opening; a combined lock and shutter, said lock holding the safety device in place; and a spring acting to hold the combined lock and shutter in locking relation with the safety device and to move the combined lock and shutter forward to close the opening in the fuse when the safety device is ejected.

6. A fuse for projectiles, comprising in combination a firing mechanism adapted to function upon impact of the projectile in any direction; a safety pin extending through an opening in the fuse, said pin engaging the firing mechanism and holding the same from action; a spring tending to withdraw and eject said pin; a combined lock and shutter located in a recess in the body of the fuse which intersects the opening in which the safety pin is located; a spring urging the lock and shutter upwardly into locking relation with the pin; and a second, manually-removable pin extending through the fuse body and lock and serving to hold the parts against accidental movement.

7. A fuse for projectiles comprising a body with a chamber formed therein and provided with an opening; firing mechanism in the chamber adapted to function on impact in any direction and including two telescoping elements, one of which has a part

thereof cut away; a member situated in the cut away portion and in the opening for holding the mechanism in same condition; and means for withdrawing and ejecting the

5 safety member from the fuse.
8. A fuse for projectiles comprising a body with a chamber formed therein and provided with an opening; firing mechanism in the chamber adapted to function on impact in any direction and including two
10 telescoping elements, one of which has a

part thereof cut away; a member situated in the cut away portion and in the opening for holding the mechanism in safe condition; means for withdrawing and ejecting the
15 safety member from the fuse; and combined locking means for the safety member and closing means for the opening in the body.

In testimony whereof I have signed my name to this specification.

FRANCIS ARTHUR SUTTON.