

F. A. SUTTON.
FUSE FOR PROJECTILES.
APPLICATION FILED DEC. 15, 1917.

1,313,651.

Patented Aug. 19, 1919.

2 SHEETS—SHEET 1.

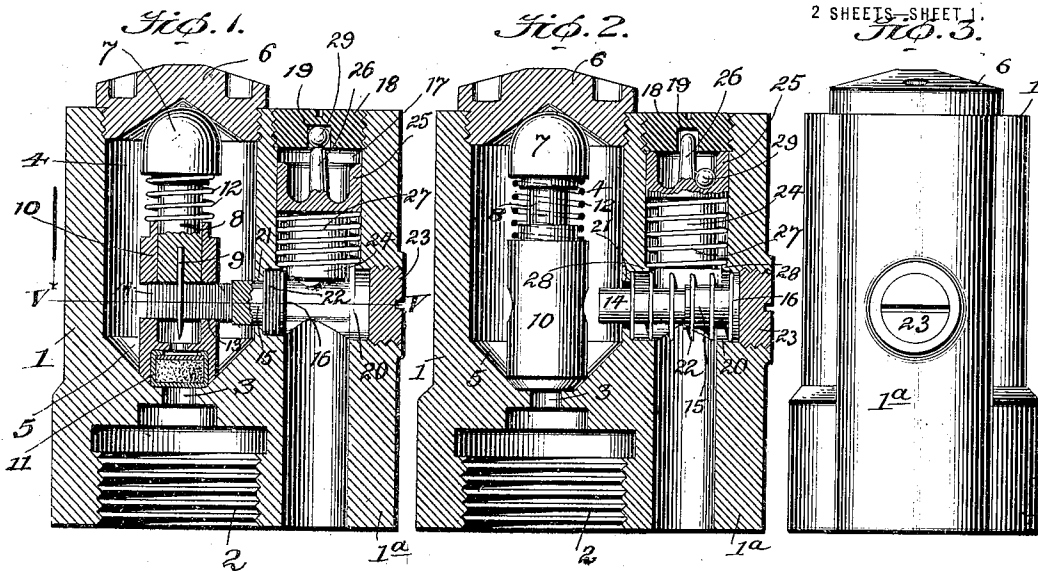


Fig. 4.

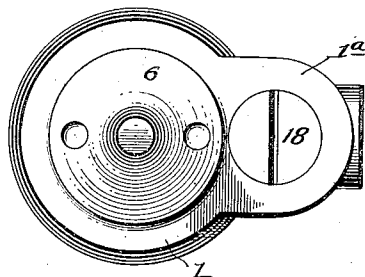
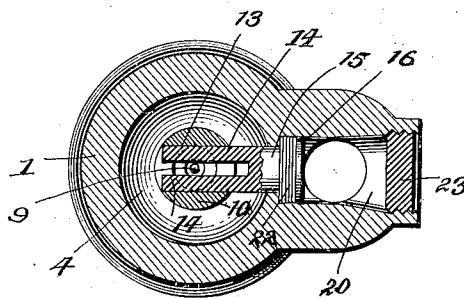


Fig. 5.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 6.

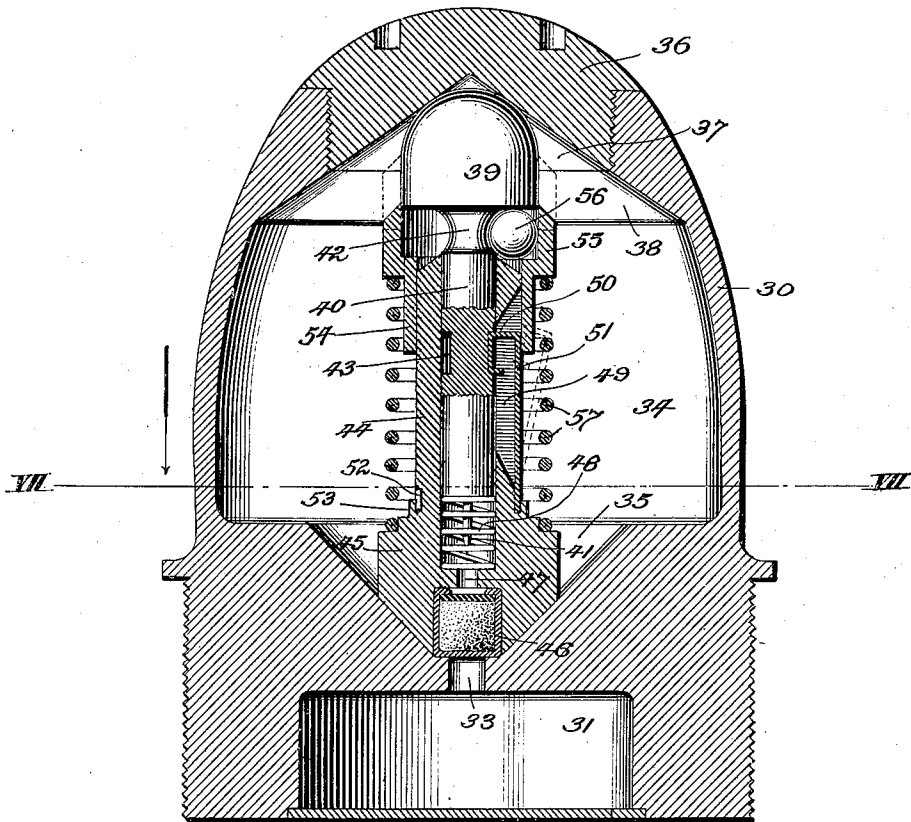
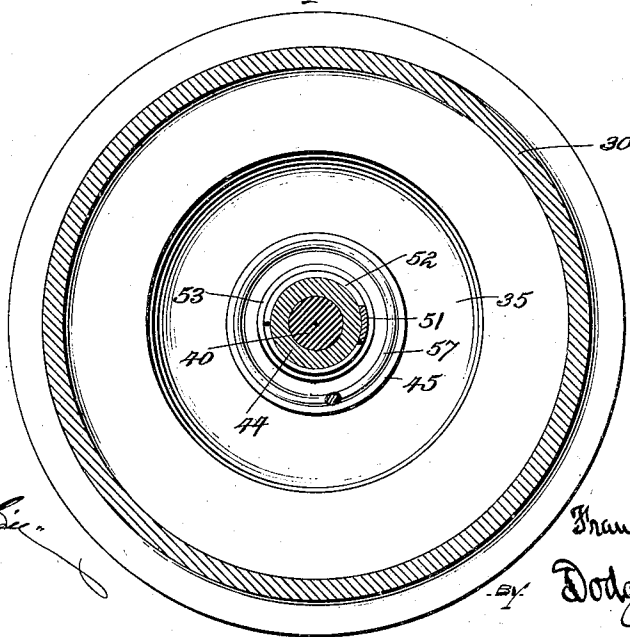


Fig. 7.



Witnesses
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UNITED STATES PATENT OFFICE.

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FUSE FOR PROJECTILES.

1,313,651.

Specification of Letters Patent.

Patented Aug. 19, 1919.

Application filed December 15, 1917. Serial No. 207,313.

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 is designed to cause an explosion of the projectile upon impact.

Among projectiles of this type are those which are thrown from trench mortars, and which must of necessity function whether the shell strike head-on, end-on, or laterally. Such shells, moreover, frequently fall upon soft ground, where they become buried before they have time to explode, and with such fuses as are now in use difficulty has arisen by reason of the fact that where the shell buries itself in the mud or soft ground, such mud will oftentimes be forced into the interior mechanism of the fuse and lock it against operation; consequently, many such shells are blinds and are ineffective.

For the sake of safety in handling projectiles provided with fuses, and also to prevent premature explosion thereof in the gun, the fuses 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 the striker is free to act on impact as desired.

In the present instance the locking device (in one form a pin and in another form a pawl) is so arranged that it does not move outwardly or clear of the fuse proper, but is carried laterally or outwardly entirely free of the striking mechanism and is precluded from again coming into locking position, such action taking place as the projectile leaves the gun or mortar.

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

Figure 1 is a longitudinal sectional view of a fuse adapted to be screwed upon the nose of a projectile, the parts being in their inoperative or locked position;

Fig. 2 a similar view, wherein the lock

or pin for the striking mechanism has been automatically withdrawn;

Fig. 3 a side elevation of the fuse;

Fig. 4 a top plan view thereof;

Fig. 5 a transverse sectional view, taken on the line V—V of Fig. 1;

Fig. 6 a vertical sectional view showing a modified construction, and in which the fuse is adapted to be screwed into an opening formed in the projectile proper; and

Fig. 7 a transverse sectional view, taken on the line VII—VII of Fig. 6.

Referring first to the construction shown in Figs. 1 to 5, 1 denotes the main body of the fuse, provided with a threaded opening 2 in its base, into which is adapted to be screwed a 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. The bottom wall 5 of the chamber 4 is inclined or coned, and a cap-piece 6, which is screwed into the upper portion of the body 1 and forms a closure for the upper end of the chamber 4, is likewise coned upon its inner face.

The striker comprises a rounded head 7, adapted to bear against the coned face of the cap-piece or closure 6, a cylindrical stem 8, and a pin 9 fixed in the lower end thereof. Said cylindrical stem 8 extends into the upper part of a cylindrical member 10, making a free fit therewith. The lower end of said member 10 is beveled to conform with the wall 5, and a detonating cap 11 is mounted in the lower end thereof, over the opening 3 and in line with the pin 9. The cylindrical member 10 and the striker (comprising the parts 7, 8 and 9) are normally held apart by a light spring 12, one end of which bears against the under face of the head 7, while the lower end takes against the upper portion of the cylindrical member 10. Said member is provided with a transversely-extending opening 13, immediately below the lower end of the member 8, said opening being formed for the reception of the bi-

furcated end 14 of a pin 15, which pin is provided with a head 16.

The body 1, or more specifically a lateral projection 1^a formed integral with the body 5 and coextensive of the length thereof, is provided with a cylindrical bore or chamber 17, the upper end of which is closed by a screw-plug 18, having a centrally-disposed socket or recess 19 formed in its inner face. 10 A transverse opening or bore 20 is formed in the member 1^a, and extends through the adjacent wall of the chamber 4, the opening being provided with a shoulder as 21 at its inner portion; or in other words, the bore or 15 opening is reduced in diameter as it enters the chamber 4. This transverse, radially-disposed bore or opening 20 is formed in alignment with the opening 13 formed in the cylindrical member 10, and the locking pin 20 15 is adapted to be inserted through the bore or opening 20, so that its bifurcated end may pass through the opening 13 in the cylindrical member 10 and straddle the pin 9, thus locking the striker and pin against any 25 movement toward the detonating cap. A spring 22 encircles the locking pin, the inner end abutting against the shoulder 21 and the outer end bearing against the head 16. The outer end of the bore 20 is closed by a screw-plug 23.

To hold the locking pin in its locked position, as in Fig. 1, I employ a set-back device, comprising a cylindrical stem or plunger 24, which is surmounted by a cup-shaped member 25 of a diameter to make a relatively 35 close fit with the bore or chamber 17, said cup-shaped member having a pin 26 extending upwardly from the center thereof to a point above its upper edge. A spring 27 encircles the stem 24, the upper end of the 40 spring bearing against the under face of the cup-shaped member 25 and at its lower end against a shoulder 28 formed just above the bore or opening 20. Normally the spring 45 acts to force the set-back device upwardly, and to restrain this upward movement and to hold the lower end of the cylindrical stem or plunger 24 in front of the head 16 a ball 29 is seated in the socket or recess 19, as 50 best shown in Fig. 1, in line with the pin 26. So long as the ball is in place there can be no upward movement of the set-back device and the parts are held in the positions shown in Figs. 1 and 5; that is to say, the locking 55 pin is held beneath the lower end of the stem 8 of the striking mechanism, and the plunger 24 extends in front of the head 16 and the spring 22 is under compression. Upon the firing of the gun the set-back device 60 will move downwardly, compressing the spring 27 and allowing the ball 29 to drop out of the socket 19 and into the cup 25. The set-back device is then free to move upwardly to the position shown in Fig. 2, the 65 pin 26 being free to enter the socket or recess

19, and in such position the lower end of the plunger 24 will clear the head 16 and allow the spring 22 to force the locking pin laterally and withdraw its bifurcated end 70 from out of locking contact with the striking mechanism. Said mechanism will then be free to operate, as upon impact of the projectile, in any direction, either head-on, laterally, or end-on, and cause a detonation 75 of the cap 11 and a consequent detonation of the charge within the shell.

A modification of the invention is disclosed in Fig. 6, wherein 30 denotes the body of the fuse, the lower end of which is exteriorly threaded and adapted to be screwed 80 into an opening formed in the shell or projectile. The lower portion of said body is provided with a powder chamber 31, closed at its lower end by a light diaphragm 32. An opening 33 extends from the upper 85 portion of the body or chamber 31 into the main chamber 34 in which the detonating mechanism is mounted. The lower wall of said chamber is, coned, as at 35, and the upper end of the chamber is closed by a 90 screw-plug 36, its inner face 37 being coned, so that when it is screwed into position such face forms a continuation of the coned surface 38, formed upon the inner wall of the chamber.

The striking mechanism may be said to 95 comprise a hammer having a head 39, a cylindrical stem 40, and a pin 41. Immediately below the head 39 the stem 40 is provided with a concave annular groove 42. A 100 second groove or channel 43 is formed around the stem. The stem is seated in a cylindrical member 44, the lower end of which is preferably enlarged, forming a 105 head 45, the lower end of said head being coned to fit the coned face 35. The enlarged head 45 is counter-bored to receive a detonating cap 46, which underlies an opening 47 in line with the pin 41. A spring 48, interposed between the lower end of the member 110 40 and the shouldered portion of the head 45, normally holds the parts separated, with the pin out of operative relation with the underlying cap. To lock the parts in this position and to enable the fuse to be readily 115 handled without danger of premature explosion, the following devices are employed: The cylindrical member 44 is cut away at one side, as at 49, to admit of the entrance of a locking head or detent 50 formed upon the 120 upper end of a spring arm 51, the arm tending, under its spring action, to swing outwardly, as shown in dotted lines in Fig. 6. The head is of such form as to enter the 125 groove or channel 43, and to prevent movement of the striker with reference to the cylindrical member 44. The lower end of the arm 51 is preferably formed integrally with a pair of arms or fingers 52 which embrace the cylindrical member 44 above the 130

head 45, and a lip 53 formed as a part of said head 45, will be turned over or peened against the arms 52 to securely hold said arms and the spring 51 in proper position.

5 To hold the head 50 in locking engagement with the stem 40, I employ a sleeve 54, which is slidably mounted upon the upper end of the cylindrical member 44, said sleeve being provided with a cup 55 in which is mounted
10 a ball 56. The ball, as will be seen upon reference to Fig. 6, is of such size as to fill the space between the groove 42 and the adjacent wall of the cup, and will prevent upward movement of the cup and sleeve so long
15 as it remains in the position shown. Normally the sleeve and cup are held in their upper position by a spring 57, which encircles the sleeve and the cylindrical member 44, bearing at one end on the under face
20 of the cup and at its opposite face on the head 45. The upper end of the cylindrical member 44 will be given a downward or outward bevel, and the upper edge of the cup will likewise be given a similar bevel, this to
25 facilitate the ball running out of the cup and over the upper end of the cylindrical member 44 when the cup is moved downwardly under "set back" upon the discharge of the gun. The ball when thus freed passes out
30 into the chamber within the fuse, and the sleeve and cup-shaped member (which may be termed a "latch") then move upwardly to the dotted-line position shown in Fig. 6, permitting the locking device or head 50 to
35 be moved outwardly through the action of the spring arm 51, which in the form illustrated is integral with said locking element 50. Thus the detonating mechanism is freed and the parts will function (as is well understood by those skilled in the art) immediately the projectile strikes against an object, whether the blow be head-on, end-on
40 or sidewise. In other words, the detonating mechanism in both forms of the structure may be said to be an all-way fuse, which will function no matter how the projectile hits.

Having thus described my invention, what I claim is:

1. In combination with a projectile, a fuse
50 therefor adapted to function upon impact of the projectile head-on, base-on or laterally; a locking device for the fuse; a spring serving to withdraw said locking device; a latch of the set-back type for holding
55 said locking device in position; and a ball normally holding the latch in operative relation with the locking device.

2. In combination with a projectile, a fuse
60 therefor adapted to function upon impact of the projectile head-on, base-on or laterally; a lock for holding said fuse in safe locked position; means independent of any rotative action of the projectile or fuse to retract said lock and to thereby release the
65 fuse; a latch of the set-back type adapted

to hold the lock in locking relation; a cup carried by said latch; and a ball interposed between the latch and an adjacent portion of the fuse and serving to hold the latch in operative relation with the lock. 70

3. In combination with a projectile, a fuse
therefor adapted to function upon impact of the projectile head-on, base-on or laterally; a lock therefor; a spring serving to
75 withdraw said lock; a latch of the set-back type cooperating with the lock; a cup carried by said latch; a ball cooperating with the latch and an adjacent portion of the structure to hold the latch in contact with
80 the lock; and a spring serving to move the latch out of the path of the lock when the ball is released from holding relation with the latch upon the set-back of the latch on the passage of the projectile from the gun.

4. In combination with a projectile, a fuse
85 therefor comprising two telescoping elements; a lock serving to prevent relative movement of said elements; a spring acting to withdraw said lock; a latch for the lock; a spring serving to move the latch out of
90 engagement with the lock; and a ball normally holding the latch in engagement with the lock, said ball being free to move out of contact with the latch upon set-back of the latch on the passage of the projectile
95 from the gun.

5. In combination with a projectile, a fuse
therefor, said fuse comprising a body having a chamber formed therein; a cylindrical
100 member; a hammer extending into one end of said cylindrical member, said hammer being provided with a circumferential groove; a locking device secured to the cylindrical member and adapted to enter the groove to thereby lock the parts to-
105 gether; a spring serving to move said locking device outwardly to release the parts; a latch slidably mounted upon the cylindrical member, the lower end thereof passing over the locking member; a spring serving nor-
110 mally to move the latch out of operative relation with the locking device; and a ball interposed between the latch and the head of the hammer, said ball serving to hold the latch in its depressed operative position
115 with reference to the locking device.

6. In combination with a projectile, a fuse
therefor comprising a body provided with a chamber, the end walls whereof are reversely
120 coned; a cylindrical member having a coned end adapted to bear against one of the coned ends of the chamber; a detonating cap carried by said member; a hammer mounted within said cylindrical member, said hammer comprising a stem and a head at the
125 upper end thereof; a spring secured to said cylindrical member, extending upwardly alongside thereof and having a head which enters an opening formed in the side wall of the cylindrical member and passes into
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a channel formed in the stem; a latch for said spring, said latch comprising a sleeve and a cup surmounting the same; a spring serving to elevate said latch; and a ball
5 seated within the cup and bearing against the under face of the head and the upper edge of the cup, and the upper end of the cylindrical member being downwardly inclined so as to permit the ball to readily move outwardly upon the set-back of the 10 latch when the projectile passes from the gun.

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

FRANCIS A. SUTTON.