

E. J. W. RAGSDALE.
 IMPACT FUSE.
 APPLICATION FILED JULY 30, 1918.

1,375,466.

Patented Apr. 19, 1921.
 2 SHEETS—SHEET 1.

Fig. 1

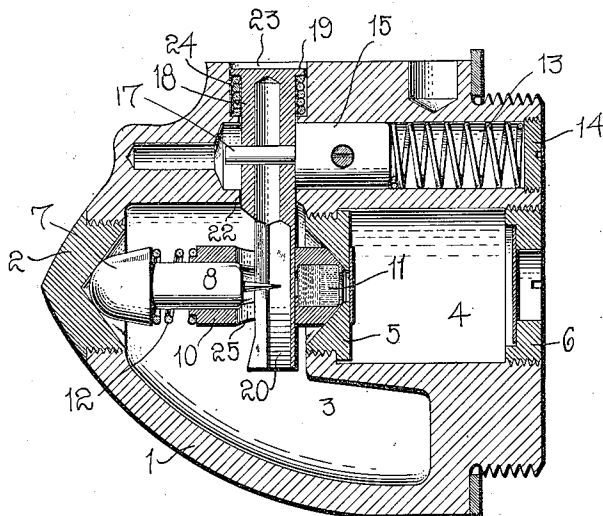


Fig. 5

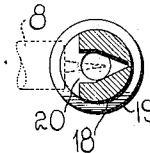


Fig. 2

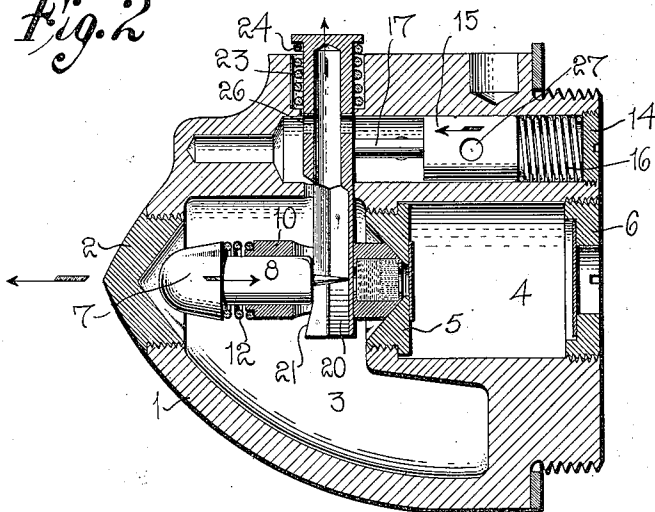
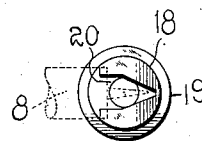


Fig. 6



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Fig. 4

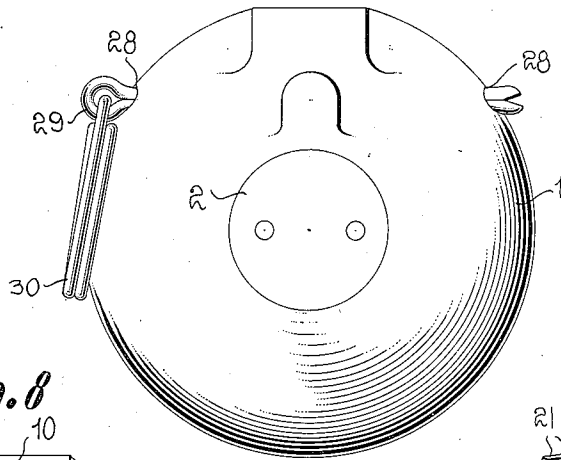


Fig. 8

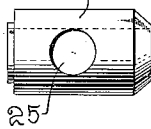


Fig. 7

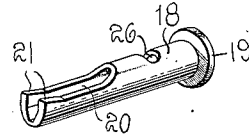


Fig. 3

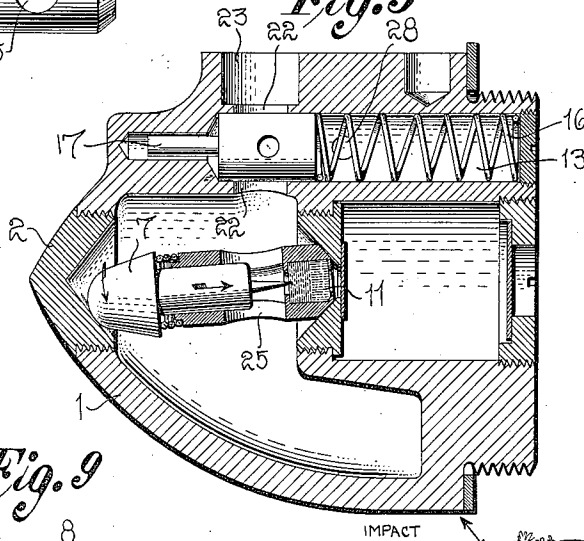
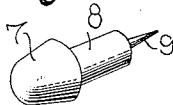


Fig. 9



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UNITED STATES PATENT OFFICE.

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IMPACT-FUSE.

1,375,466.

Specification of Letters Patent.

Patented Apr. 19, 1921.

Application filed July 30, 1918. Serial No. 247,381.

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

To all whom it may concern:

Be it known that I, EARL J. W. RAGSDALE, Lieut. Colonel, Ordnance Department, United States Army, a citizen of the United States, stationed at Washington, D. C., in the office of the Chief of Ordnance, 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 the payment of any royalty thereon.

This invention relates to an improvement in impact fuses for projectiles with special reference to the type thrown from trench mortars.

Experience has shown that the percentage of failures among the trench mortar projectiles is very high and these failures are in many instances due to the premature explosion of the projectile. This invention therefore deals with an arrangement whereby the detonation of the fuse is retarded, and, more specifically, with a retarding arrangement for that type of fuse wherein the safety holding pin or fork is moved out of engagement with the firing means.

According to the present invention the safety fork is arranged and formed so as to retard the action of the actuating spring during acceleration so that the projectile will be entirely out of and clear of the gun before the fork is disengaged.

In the embodiment illustrated in the drawings the invention comprises an upturned or beveled surface provided on the end of the fork, which surface during acceleration frictionally bears against the shoulder of the striker when the ejecting spring is functioning to retard its action in throwing out the fork. Though other embodiments of the invention are possible, the above form is illustrated in the accompanying drawings wherein:

Figure 1 is a transverse section of a fuse taken on the axis of the projectile showing the parts in normal safety position;

Fig. 2 is a like view showing the set-back pellet in unlocking position, and the functioning of the retarding arrangement;

Fig. 3 is a like view, but showing the parts

at the instant of lateral impact with the fork ejected, and the set-back pellet closing the opening through which it is ejected;

Fig. 4 is an elevation showing the safety pin in position;

Fig. 5 is a section of the safety fork taken on the axis of the fuse when the parts are in normal position;

Fig. 6 is an end view of the fork taken when the parts are as shown in Fig. 2;

Figs. 7, 8 and 9 are perspective views of the safety fork and of the sleeve and striker and firing mechanism respectively.

The fuse comprises a hollow, cone-shaped body 1, adapted to be screwed into a threaded recess formed in the nose of a projectile. The point of the fuse consists of a cone cap 2 screwed into a suitably threaded opening of the body 1. The cap forms a closure for the main chamber 3 and is coned upon its inner surface. An axially arranged powder chamber 4 is separated from chamber 3 by the seat 5 coned on its side toward chamber 3. The inner end of the powder chamber is normally closed by the plug 6.

The detonating or firing mechanism comprises a striker shown in detail in Fig. 9 and the sleeve shown in detail in Fig. 8. The striker is provided with a round head 7, a cylindrical stem 8 and a fixed firing pin 9. The stem 8 extends into one end of a cylindrical sleeve 10 and slides freely therein. The other end of the sleeve carries a percussion cap or primer 11 in alignment with the pin 9 of the striker. The sleeve and the striker are held apart by a light spring 12 surrounding the stem 8, and bearing with one end against the head 7 of the striker and at its other end against a shoulder on the sleeve. The end of the sleeve carrying the primer is of a frusto-conical shape and seats in the coned surface of member 5, while the rounded head 7 of the striker normally bears against the coned inner surface of the cap 2.

Lateral to, but parallel with, the axis of the fuse is a cylindrical bore or chamber 13, the inner end of which is closed by the plug 14. This bore houses the set-back pellet 15 and the spring 16. The pellet is provided at its forward end with a lug or pin 17 which, due to the compression of the spring 16 between the plug 14 and the inner end of the pellet, locks the safety holding fork or

pin. The safety fork is hollow and has a body 18 and a head 19. The inner end of the pin has a longitudinal slot cut into one side about one-half the distance of its length so as to form a trough 20, as clearly shown in Fig. 7. The fork, due to its trough-like shape, constitutes a safety arrangement for preventing the pin 9 of the striker from contacting with the cap 11, due to impact along the axial line of the fuse, until the fork is moved entirely out of contact with the striker. The edges of the trough 20 are each provided with a beveled surface 21 at the extreme inner end of the fork. The purpose of this bevel will be explained hereafter.

The safety fork is housed in a transversely extending bore 22 connecting the chambers 3 and 13 just in front of the seat 5. The enlargement 23 of the bore 22 in the outer wall of the body 1 provides a shoulder in the bore between which shoulder and head 19 of the fork there is held the actuating or ejecting spring 24, normally urging the pin outwardly. The sleeve 10 of the firing mechanism is provided with a transverse opening 25 through which the trough-like end 20 of the safety fork extends. The pin 17 of the set-back pellet locks the fork in safety position by extending through holes 26 provided in the fork.

A safety pin 29 is provided to positively secure the parts in safety position during transportation. The pellet 15 is provided with an opening 27 which aligns with openings 28 in the body of the fuse when the parts are in position as shown in Fig. 1, thereby permitting the ready insertion and withdrawal of the safety pin. This pin is of the usual split cotter-pin type and is withdrawn by means of ring 30 just prior to the loading of the projectile into the gun.

The operation is as follows:

The safety pin having been withdrawn before loading so that the set-back pellet 15 will function, the parts are as shown in Fig. 1, with the pin 9 of the striker in the trough of the fork. The firing of the gun will cause that pellet to compress the spring 16 owing to set-back or inertia, and consequently the pin 17, disengaging from the safety fork, leaves the latter free to be ejected under action of the spring 24. The safety fork is thrown out from the fuse only after the projectile has left the gun and is well clear of the same, due to the retarding action of the beveled surfaces 21 of the fork. From Fig. 2 it will be noticed that as the spring 24 is functioning, and during acceleration, the surfaces 21 of the fork, due to their wedging action in cooperation with the lower end of the cylinder 8 of the striker, retard the movement of the safety fork until the projectile is fully clear of the gun or mortar, for, as long as the projectile is

being accelerated, the striker is exerting a rearward pressure, in the direction indicated by the arrow in Fig. 2, against the edges of the trough.

The fuse is adapted to function on impact, no matter in what direction, head-on, base-on, or laterally, the same may take place. In case of either head-on or base-on impact, the action is clear, the striker and sleeve merely coming together, compressing the spring 12, and the pin 9 puncturing the cap 11. In case of lateral impact, for instance, as shown in Fig. 3, the two cone-like surfaces at the inside of cap 2 and of seat 5 cause a camming action of the striker and sleeve respectively, to similarly operate the detonating mechanism.

As further shown in Fig. 3, after the safety holding fork has been fully ejected, the spring 16 moves the pellet 15 forward so that it acts as a shutter and closes up the opening in the body of the fuse through which the fork has been ejected, thus preventing mud and dirt from entering the fuse on impact and impairing the operation of the same.

From the foregoing description it will be noted that none of the parts of the fuse depends on the action of centrifugal force. Further, that the retarding arrangement is due to friction and inertia, functioning as long as and only while the projectile is being accelerated, and is simple and positive in action, thus insuring safety to the operators of the gun or mortar and greater assurance that the fuse will properly function.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In a fuse for projectiles, the combination of a fuse body provided with an opening; firing mechanism in the body; combined holding and retarding means for retaining said mechanism in safe condition during acceleration; and means for ejecting said combined means through said opening.

2. In a fuse for projectiles, the combination of a hollow body having an opening in the wall thereof; firing mechanism in the body functioning on impact in any direction; combined holding and retarding means for retaining the mechanism in safe condition during acceleration; and means for ejecting said combined means through said opening.

3. A fuse for projectiles comprising in combination, firing mechanism adapted to function on impact in any direction, a safety device for holding said mechanism in safe condition movable through an opening in the wall of the fuse, means to eject said safety device, and locking means of the set-back type for retaining said safety device normally in place, and retarding means for preventing the premature ejection of the safety device.

4. A fuse for projectiles comprising a body provided with a chamber having an opening in the wall thereof; firing mechanism in the chamber adapted to function on impact in any direction and including two telescoping elements, one of which elements has an opening alined with that in the body; a device situated in the alined openings for holding the mechanism in safe condition; means for withdrawing and ejecting the safety device from the fuse; and combined locking means for the safety device and closing means for the opening in the body.

5. In a fuse for projectiles, the combination of a fuse body provided with an opening; firing mechanism in the body functioning on impact in any direction and consisting of a striker and sleeve, said sleeve being also provided with an opening; a safety fork for the firing mechanism extending in line with the openings in the sleeve and body through which the fork may be introduced, a spring acting to withdraw and eject the fork through the opening in the fuse body; a combined lock and shutter; and

a spring urging the lock and shutter into locking relation with the fork and to close the opening in the body when the fork is ejected.

6. A fuse for projectiles comprising a body provided with a chamber having an opening in the wall thereof, and the end walls whereof are reversely coned; a sleeve having a coned end bearing against one of the coned ends of the chamber, and provided with a lateral opening; a detonating cap carried by the sleeve; a striker comprising a head, stem, and firing pin; the stem of the striker sildable in the sleeve and the pin being in alinement with the cap; a laterally extending device situated in the openings in the sleeve and fuse body for holding the parts in safe condition; means for withdrawing and ejecting the safety device from the fuse; and means for retarding the action of the ejecting means during acceleration comprising an inclined surface on the end of the safety device and coöperating with the stem of the striker.

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