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D. L. WOODBERRY

2,118,062

BORE SAFE FUSE

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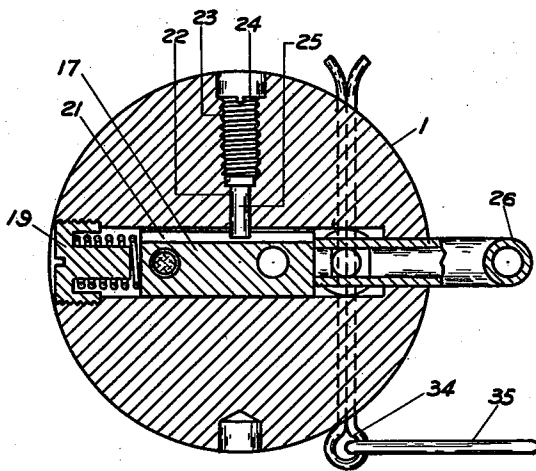


Fig. 2

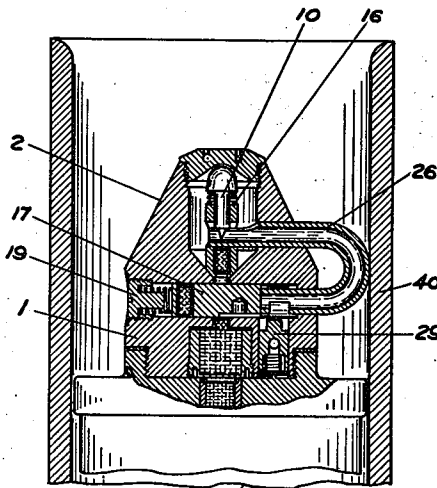


Fig. 3

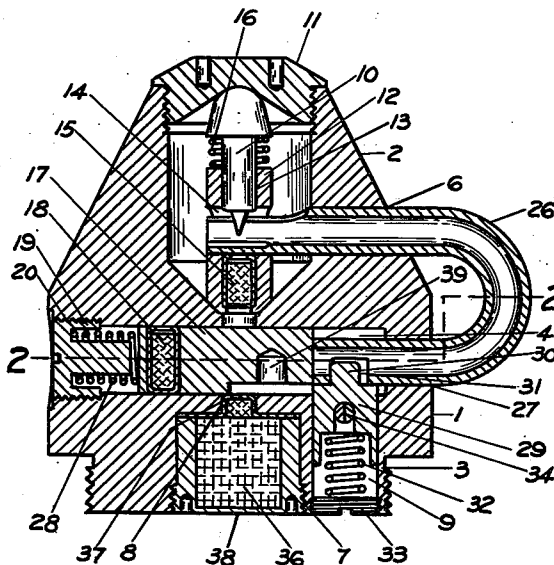


Fig. 1

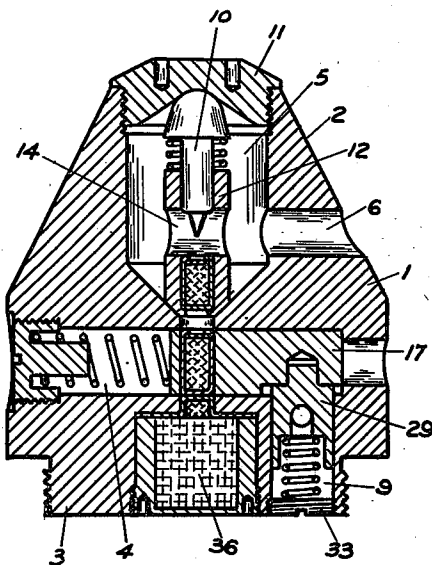


Fig. 4

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BORE-SAFE FUSE

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6 Claims. (Cl. 102—39)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

This invention relates in general to actuating mechanisms and more particularly has reference to an all-ways, bore-safe fuse.

Previous to this time in fuses of this character, it has been customary to positively lock a firing pin out of contact with an aligned primer and auxiliary booster charge, the primer and auxiliary booster charge being aligned at all times. A fuse of this character is not bore-safe, and does not permit its assembly to a shell to make a complete round until ready to fire, and then extreme care in handling and firing should be exercised. It will be apparent that a fuse of this character tends to complicate handling and storage in that the fuse has to be stored and shipped separate from the shell and bursting charge proper.

An object of this invention is to provide an all-ways, bore-safe fuse having a firing pin positively locked out of contact with an aligned detonator before ejection from the muzzle of the piece from which it may be fired.

Another object of this invention is to provide an all-ways, bore-safe fuse having a detonator carrier adapted to interrupt the explosive train and containing a detonator therein out of alignment with the said explosive train adapted to be released for alignment therewith on firing and to align after ejection from the muzzle of the piece from which it may be fired.

Still another object of this invention is to provide an all-ways, bore-safe fuse having a detonator carrier normally out of alignment with the explosive train prior to ejection from the muzzle of the piece from which it may be fired, adapted to be aligned therewith and locked in place after being ejected from the muzzle of the piece from which it may be fired.

A further object of this invention is to provide an all-ways, bore-safe fuse having a U-shaped safety fork, one leg of which is adapted to lock the firing pin out of contact with the detonator aligned therewith and the other leg is adapted to hold the detonator carrier in a position to interrupt the explosive train and hold the detonator contained therein out of alignment therewith previous to firing from the piece.

It will thus be apparent that the objects of this invention are in general to provide an all-ways, bore-safe fuse having a slidable detonator carrier and a firing pin having a common arming feature adapted to become armed after ejection

from a weapon, and the firing pin to set off the explosive train upon impact with the ground regardless of the angle the fuse strikes the ground.

With these and other objects in view which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention may be varied in construction, proportions and arrangement, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawing means for carrying the same into practical effect, without limiting the improvements in their useful applications to the particular constructions, which for the purpose of explanation, have been made the subject of illustration.

In the drawing forming a part of this application:

Figure 1 is a longitudinal sectional view of the fuse fully loaded before assembling to a shell.

Figure 2 is a sectional view of the fuse taken on line 2—2 of Figure 1.

Figure 3 is a longitudinal sectional view of the fuse assembled to a shell being ejected from the muzzle of a piece.

Figure 4 is a longitudinal sectional view of the fuse and shell in flight after ejection from the muzzle of the weapon.

Referring more particularly by numerals to the drawing in which the same and similar elements are designated by like symbols of reference throughout, and more particularly to Figure 1, there is shown an integral fuse body 1 formed at the top with a truncated head portion 2 and at the bottom with a downward projecting neck 3. The mid-section of the body is provided with a vertical bore 5 of larger diameter and a horizontal aperture 6. The bore 4 is closed at one end with a screw cap and open into one face of the fuse body at the other through a constricted bore while the bore 5 opens into the nose of the head at one end and is closed with another screw cap and the other end of restricted diameter communicates with the bore 4. One end of the horizontal aperture 6 communicates with the vertical bore 5 and opens into one face of the fuse head at the other.

The neck is provided with a vertical bore 7, opening in the bottom thereof at one end, and communicating at the other with a smaller bore 8 opening into the horizontal bore 4, the same corresponding with and being in alignment with

the vertical bore 5 opening into the other side thereof. The neck of the fuse is provided in addition with a vertical bore 9 located between the bore 7 and the outer wall of the neck.

5 A firing pin 10 is adapted to fit into the vertical bore 5. The top portion of the firing pin is provided with a ball-shaped head. The ball-shaped head is adapted to fit into a cone-shaped socket provided in the screw cap 11 which closes one end of the vertical bore 5. A sleeve 12 is also adapted to fit into the vertical bore 13, having a horizontal bore 14. The top end of the vertical bore 13 is adapted to have the firing pin 10 fitted therein, whereas the bottom end of the bore 13 10 is provided with a primer detonator 15. A spring 16 is adapted to fit around the firing pin 10 between the head of the firing pin and the top of the sleeve thereby forcing the head of the firing pin into the cone-shaped socket in the screw cap 11 and at the same time forcing the bottom of the sleeve 12 into the cone-shaped bottom of the vertical bore 5.

A detonator carrier 17 having a vertical aperture formed in one end thereof and extending therethrough for carrying a detonator 18, is mounted in the horizontal bore 4. After insertion of the detonator carrier in the bore 4, the bore 4 is closed by a screw cap 19, fitted in the seat 20 forming an extension of the bore 4 and communicating with the outer portion of the fuse head 2.

The detonator carrier 17 is provided with a longitudinal groove 21 (Figure 2) on one side thereof. At right angles to the bore 4, the fuse body is provided with a bore 22 extending into a bore 23 of enlarged diameter communicating with the outer portion of the fuse head. A screw 24 is fixed in the bore 23, having an extension 25 of constricted diameter extending through the bore 22, and fitting in the groove 21, formed in the detonator carrier 17 to prevent rotation thereof.

The U-shaped safety fork 26 is adapted to fit in the bores 6 and 27 extending from the bores 4 and 5. One end of the fork passes through the horizontal bore 14 of the sleeve 12 between the bottom of the firing pin 10 and the top of the primer-detonator 15, thereby locking the firing pin out of contact with the primer-detonator aligned therewith. The other end passes through the bore 27 into the bore 4 and holds the detonator carrier in the unarmed position against the action of the spring 28 until after the fuse is fired from the piece.

55 Movement of the U-shaped safety fork is prevented by a set-back pellet 29, as shown in Figure 1, seated in the vertical bore 9. The pellet 29 is provided with an integral extension 30, adapted to fit in a slot 31 in one end of the safety fork 26. The extension 30 is held in the slot 31 by a spring 32 in the bore 9 which is seated on a screw plug 33. Movement of the pellet 29 is prevented by a safety pin 34 which passes through the body of the fuse and the pellet. The removal of the safety pin is facilitated by a pull ring 35 as shown in Figure 2, fastened thereon.

The bores 7 and 8 in the neck of the fuse are adapted to contain an auxiliary booster charge 36. The bore 8 is closed at the top with a thin metal cup 37, and the bore 7 is closed at the bottom with a screw cap 38 which retains the auxiliary booster charge.

The operation of the invention will be readily understood by first having reference to Figures 75 3, 4 and 5.

When it is desired to fire a projectile having the fuse forming the subject matter of this invention assembled therein, as shown in Figure 3, the safety pin 34 is removed, freeing the set-back pellet 29. The projectile is then inserted in the barrel of a weapon, movement of the safety fork being prevented as shown in Figure 1 by engagement of the extension 30 of the pellet 29 with the slot 31 therein. On firing the force of set-back charge is adapted to set-back the pellet 29 against the spring 32, compressing it so that the detonator carrier and safety fork are released as shown in Figure 3.

It will be apparent, with the set-back pellet in the rearward position, the safety fork and detonator carrier are free to move outward under the force of the spring 28, until the safety fork comes in contact with the inside of the barrel 40 as shown in Figure 3.

After the projectile leaves the muzzle of the weapon, the spring 28 is adapted to move the detonator carrier over to the armed position to align the detonator 18 with the primer-detonator 15 and the auxiliary booster charge 36. Concomitantly with movement of the detonator carrier to the armed position, the safety fork is ejected from the body of the fuse by the action of the spring 28 and falls away into the air thereby leaving the firing pin free to function the primer-detonator 15 on impact with the target as shown in Figure 5.

The detonator carrier 17 is locked in the armed position by engagement of the extension 30 of the pellet 29 in the aperture 39 in the detonator carrier 17 as shown in Figure 4 when the shell is in flight.

Figure 4 shows the projectile in flight with the fuse in the armed and locked position ready to function upon impact with the target.

On impact with the target the firing pin engages with and sets off the primer-detonator, causing the detonation of the auxiliary booster charge and bursting charge proper in the shell.

There is accomplished by this invention an all-ways, bore-safe fuse for smooth bore pieces having a detonator carrier normally held in the unarmed position by a U-shaped safety fork adapted to arm and lock in the firing position while in trajectory after it is fired from the mortar.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth by way of illustration as it is apparent that many changes and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

I claim:

1. A safety impact fuse for shells comprising a fuse body, a primer charge, a firing pin in alignment with said primer charge, a transversely movable member carrying a detonator charge, a safety locking fork holding the transversely movable member in unarmed position and interposed between said firing pin and primer charge, and means to maintain said locking fork in safe position until the shell leaves the gun barrel.

2. The invention as described in claim 1 wherein said last-named means includes a portion on the fork adapted to engage the interior wall of the gun barrel.

3. The invention as described in claim 1 wherein said last-named means includes a latch for said fork released by set-back of the shell.

5 4. The invention as described in claim 1 wherein said last-named means comprises a latch for said fork released by set-back of the shell, a portion of the fork then engaging the interior wall of the gun barrel.

10 5. A safety impact fuse for shells comprising a body, a primer charge, and a booster charge in alignment but separated from one another, a transversely movable member carrying a detonator charge, a firing pin in alignment with said primer charge, a safety fork having a part interposed between said firing pin and primer charge
15 and a part holding said transversely movable member with its detonator charge out of alignment with said booster charge, set-back releasable means for retaining said fork in safe posi-

tion, and means to retain said fork in safe position until the shell leaves the gun barrel.

6. A safety impact fuse for shells comprising a body, a primer charge and a booster charge in alignment but separated from one another, a member carrying a detonator charge, a firing pin in alignment with said primer charge, a safety fork having two arms, one arm normally holding the detonator charge in unarmed position and the other arm normally separating the firing pin and primer charge, a latch retaining said fork in safe position, said latch being released upon set-back of the shell, said fork being retained in safe position by engagement thereof with the gun barrel, and means on the detonator charge carrying member engageable by said latch to hold said detonator in armed position during flight of the shell.

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