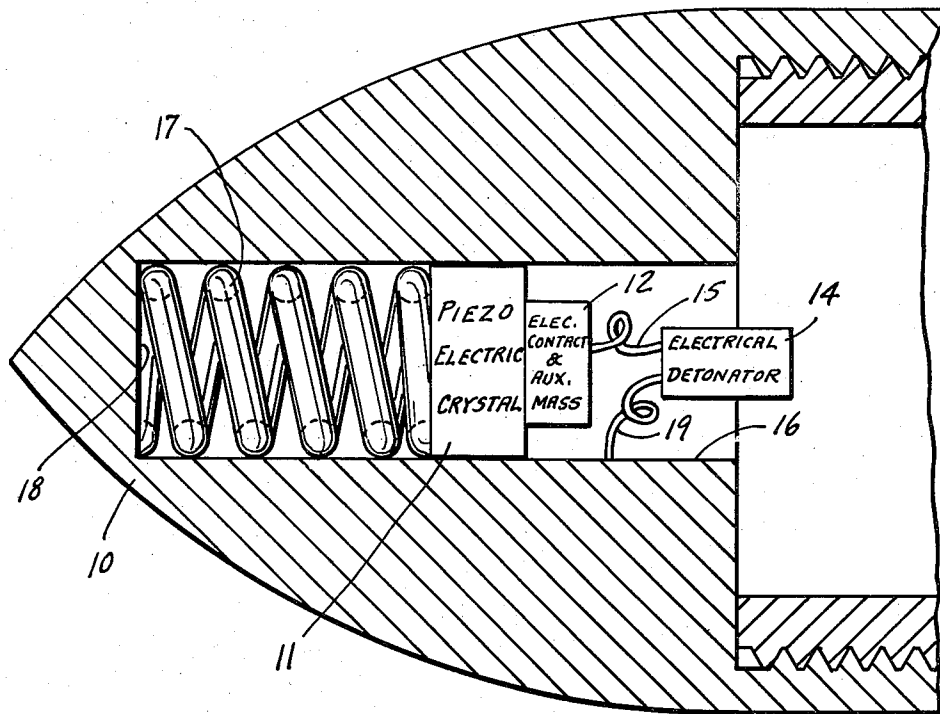


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DETONATION DELAY DEVICE

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DETONATION DELAY DEVICE

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5 Claims. (Cl. 102—70.2)

This invention relates generally to devices for detonating projectiles or rockets, and more particularly it relates to a detonation device adapted to delay detonation of a rocket or projectile until after such rocket or projectile has penetrated its target.

Many conventional devices for detonating projectiles or rockets respond directly and immediately to impact of the projectile or rocket with its target, whereby explosion of the missile occurs at the outer surface of the target. In the case of aircraft, damage thereto is materially less where the explosion occurs outside of the aircraft hull. On the other hand, explosion of a missile within an aircraft hull causes extensive damage within the aircraft and is much more effective in destroying the internal basic structure of the aircraft. Internal explosion of the missile can totally destroy an aircraft where external explosion does comparatively slight damage, and in most cases fails to disable the aircraft. The same effects apply to tanks and watercraft.

Where it is desired to utilize electrical detonation of a projectile or rocket, electrical delay circuits may be utilized for causing delayed detonation after actuation of an electrically responsive impact actuated fuse. Such delay circuits are sometimes unstable, and in the case of relatively small projectiles or rockets the space requirements are excessive.

Accordingly, it is the principal object of this invention to provide a simple and stable means for delaying detonation of a projectile or missile until it has penetrated its target.

Another object of this invention is to provide a mechanical delay means for actuating an electrically actuated detonator within a predetermined time interval after a rocket or projectile penetrates its target.

Still another object of this invention is to provide a simple and stable means of transmitting a shock wave with predetermined delay from the nose of a projectile or rocket to an electrical detonating mechanism.

In accordance with this invention there is provided a detonation delay device for projectiles or rockets comprising an electrical transducer adapted to be mounted in the nose of a projectile or rocket and operatively associated with an electrical detonation device, and a mechanical shockwave delaying means operatively connected between the nose of said projectile or rocket and said electrical transducer for transmitting the shock wave generated by impact of a rocket or projectile with its target, thereby to actuate said transducer within a predetermined time period after such impact.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

The single figure of the drawings is a longitudinal cross section of a projectile illustrating a detonation delay device in operative relation thereto.

In accordance with this invention there is provided in the nose portion 10 of a rocket or projectile an electrical

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transducing device, such for example as a piezo-electric crystal 11. On the rear side of crystal 11 there is provided an electrical contact and auxiliary mass 12 connected to an electrical detonator 14 by means of a conductor 15. Within the bore 16 and between the nose of the projectile and the crystal 11, there is a coil spring or other form of resilient member 17, the front end of which abuts the wall 18 of bore 16 and the rear end of which abuts the front surface of crystal 11. The electrical circuit extends from crystal 11 through contact device 12, conductor 15, electrical detonator 14, conductor 19, the metallic nose 10 of the projectile and spring 17.

Upon impact of the projectile or rocket with its target, a sonic shock wave is initiated in the nose portion 10. This shock wave travels relatively slowly through the resilient member or spring 17 because of the elasticity of member 17. Spring 17 may be designed to provide within limits any desired delay of travel of the shock wave, whereby the shock wave actually reaches crystal 11 at some finite time after the impact of the projectile or rocket with its target. When this shock wave reaches crystal 11, it causes stresses therein and a resultant electrical impulse to the detonator. Accordingly, detonation will occur at a predetermined time interval after impact.

From the foregoing description it will be apparent that this invention provides a simple delay mechanism having minimum space requirements and adequate stability so that action of an electrical detonator may be delayed for any desired period.

The invention claimed is:

1. A detonation delay device for a projectile or rocket comprising the nose portion of said projectile or rocket, an electrical detonator mounted in and connected to the nose portion of said rocket or projectile, a piezo-electric crystal electrically connected to said detonator and mounted within said nose portion, and a coil spring in contact with said nose portion and said crystal for transmitting shock waves resulting from impact of said nose portion with a target to said crystal with predetermined time delay, whereby said detonator is actuated a predetermined time period after said impact.

2. A detonation delay device for a projectile or rocket comprising the nose portion of said projectile or rocket, an electrical detonator mounted in and connected to the nose portion of said rocket or projectile, a transducer electrically connected to said detonator and mounted within said nose portion, and a coil spring in contact with said nose portion and said transducer for transmitting shock waves resulting from impact of said nose portion with a target to said transducer with predetermined time delay, whereby said detonator is actuated a predetermined time period after said impact.

3. A detonation delay device for a projectile or rocket comprising the nose portion of said projectile or rocket, an electrical detonator mounted in said rocket or projectile, a transducer electrically connected to said detonator, and a resilient member in contact with the projectile or rocket casing and said transducer for transmitting shock waves resulting from impact of said casing with a target to said transducer with predetermined time delay, whereby said detonator is actuated a predetermined time period after said impact.

4. A detonation delay device for a projectile or rocket having a casing, comprising an electrical detonator mounted in said rocket or projectile, a transducer electrically connected to said detonator, and means in contact with the projectile or rocket casing and said transducer for transmitting shock waves resulting from impact of said casing with a target to said transducer with predetermined time delay, whereby said detonator is actuated a predetermined time period after said impact.

5. A detonation delay device for a projectile or rocket having a casing comprising an electrical detonator mounted in said rocket or projectile, a transducer electrically connected to said detonator, and a coil spring in contact with the projectile or rocket casing and said transducer for transmitting shock waves resulting from impact of said projectile or rocket with a target to said

transducer with predetermined time delay, whereby said detonator is actuated a predetermined time period after said impact.

References Cited in the file of this patent

FOREIGN PATENTS

277,052 Switzerland ----- Nov. 1, 1951