PART 4 : SECTION 1

CHAPTER 5

FUSING OF MISSILES

Introduction

1. Correct choice of fusing is essential to obtain the maximum effectiveness of a missile against a specific target and has a direct effect on the success or failure of an operation. An instance of such a failure occurred in France, in 1944, when several hundred medium bombers attacked bridges on enemy supply routes, obtaining direct hits and near misses, yet leaving the bridges standing because the bombs were incorrectly fused.

2. The distance that a missile penetrates varies with the resistance of the target, shape or construction of the missile, speed and altitude of release, angle of strike, and velocity of impact. The fuse selected should therefore provide sufficient delay to ensure that the missile bursts at or near its optimum depth of penetration for the specific target. If the target is most susceptible to damage by blast or fragmentation missiles, the size of the area over which the missile will be effective will be governed by the height of burst. The missile used should therefore be fused for an air burst, or instantaneous burst on impact, to produce the maximum area of effectiveness.

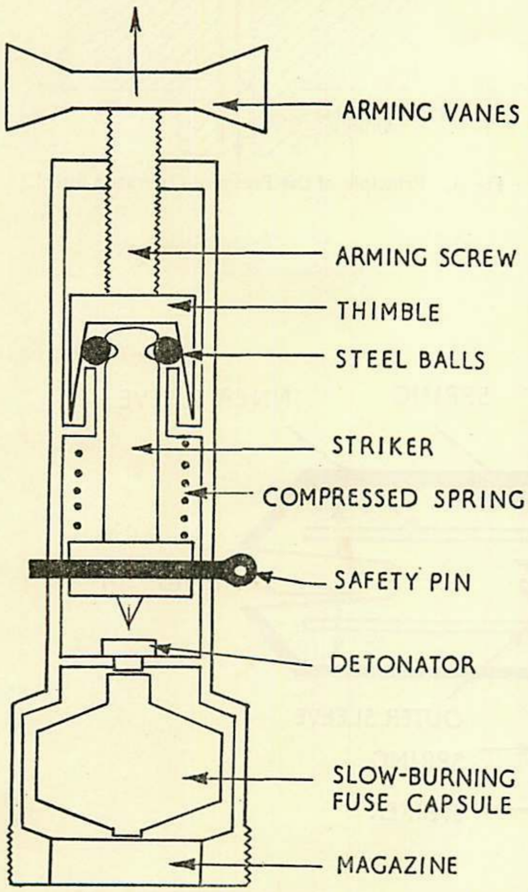

Fig. 1. Schematic Diagram of Slow-Burning Fuse.

3. The major fusing components used to achieve these effects are discussed in the following paragraphs.

Fuses

4. A fuse is a device containing an explosive which is used to bring about the functioning of a missile. Fuses are classified according to their system of functioning, *i.e.* time, barometric, hydrostatic, or proximity, the appropriate type being used to achieve detonation of the missile at the required position relative to the target.

(*a*) *Time Fuses.* Time fuses (Fig. 1) may have mechanical or pyrotechnic delay systems which allow a period of time to elapse before the fused missile explodes. Mechanical delay systems are usually clockwork or electric ; pyrotechnic delay systems contain a delay capsule. They are used primarily in clusters, flares, and photo-flashes, but may be used with other missiles.

(*b*) *Barometric Fuses.* Barometric fuses (Fig. 2) are made to function by the contraction of a vacuum bellows as the missile descends into gradually increasing barometric pressure. The movement of the bellows frees a striker which initiates the train of explosives. These fuses may be used in clusters and in target indicators where an air burst at a preselected height is required.

(*c*) *Hydrostatic Fuses.* Hydrostatic fuses (Fig. 3) are used in missiles designed to explode under water, and are preset to function when the missile has descended to the requisite depth for maximum effect. As the missile sinks, increasing water pressure causes movement of a bellows which frees a striker.

(*d*) *Proximity Fuses.* Proximity fuses are operated by electronic means. They are used to produce an air burst for maximum blast or fragmentation effects.

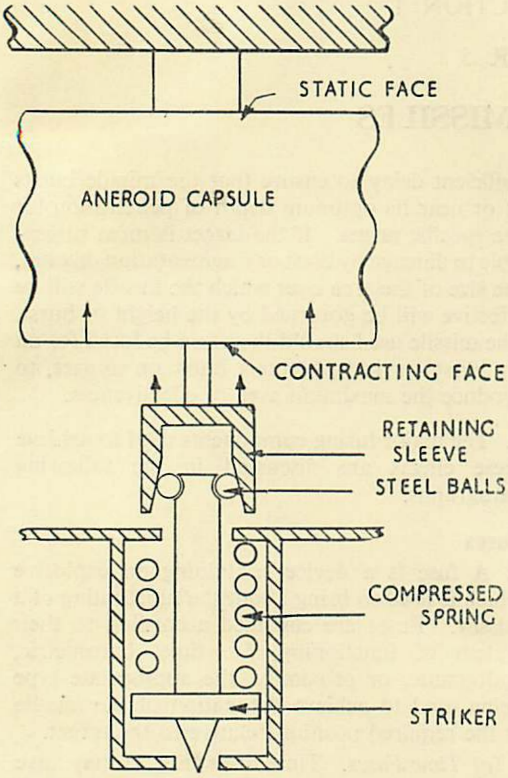

Fig. 2. Action of the Barometric Fuse.

Pistols

5. A pistol is a mechanical device, used to initiate the functioning of a missile. It does not contain any explosive material. Pistols may be classified as pressure-operated, impact, inertia, or delay, and are used in the same way as fuses to detonate the missile at the required position relative to the target.

(a) *Pressure-Operated.* This nose pistol (Fig. 4) is operated by the air pressure built up between the missile and the ground. When the air pressure is high enough it reverses a thin diaphragm to which the striker is attached. The striker hits and fires the detonator. It is used on H.C. and fragmentation missiles.

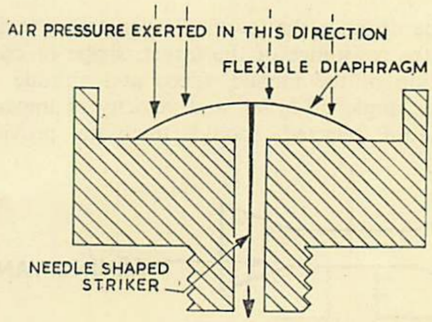

Fig. 4. Principle of the Pressure-Operated Pistol.

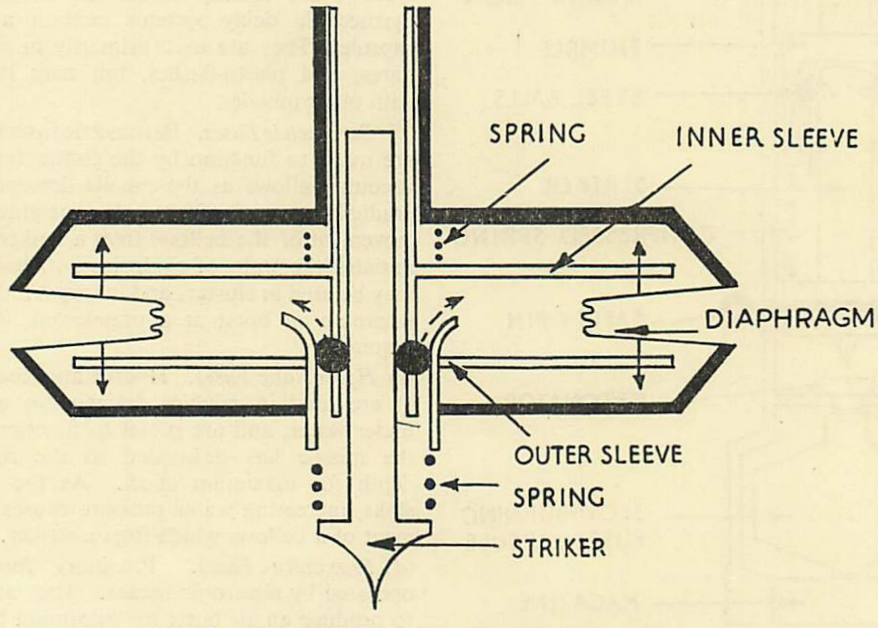

Fig. 3. Diagram Showing Principle of Hydrostatic Fuse.

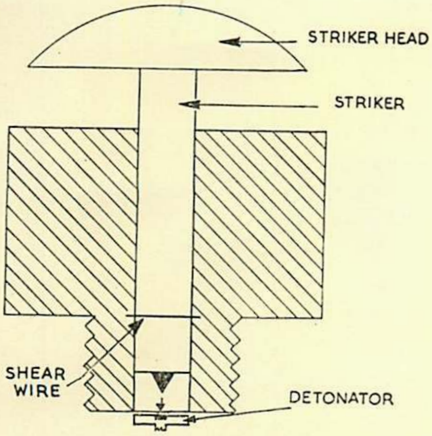

Fig. 5. Impact-Operated Nose Pistol.

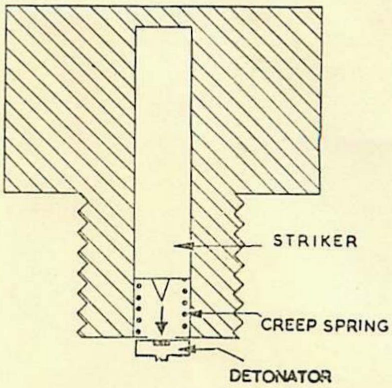

Fig. 6. Simple Inertia-Operated Pistol.

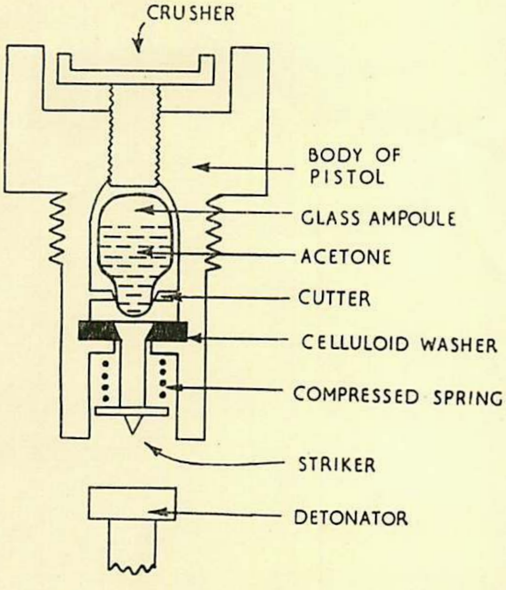

Fig. 7. Schematic Diagram of Long-Delay Pistol.

(*b*) *Impact*. This is a simple type of nose pistol in which the striker is actuated by impact with the ground (Fig. 5). The striker is held in a position away from the detonator by a wire which is sheared on impact, allowing the striker to fire a detonator.

(*c*) *Inertia-Operated.* The inertia-operated pistol (Fig. 6) is the most common type, and is used in the tail position. It has a heavy striker supported by a creep spring, and at the moment of impact the inertia of the striker overcomes the spring and fires the detonator.

(*d*) *Delay*. Delay pistols (Fig. 7) are used for tail fusing and utilize the solvent action of acetone on celluloid to produce varying delay periods, from 30 minutes to 144 hours. A capsule containing acetone is crushed by the arming action of the pistol, and the acetone dissolves the celluloid disc which retains the striker. When freed the striker is driven on to a detonator by a compressed spring. Varying delays can be obtained by diluting the acetone or inserting a greater number of celluloid discs


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