Jan. 3, 1961 H. E. TATEL 2,966,856

MAGNETIC DETONATOR

Filed Feb. 7, 1946

FIG. 1

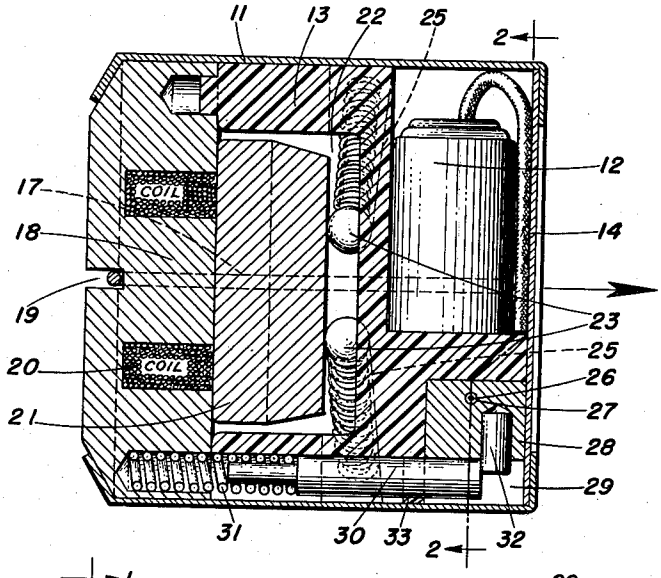


FIG. 2

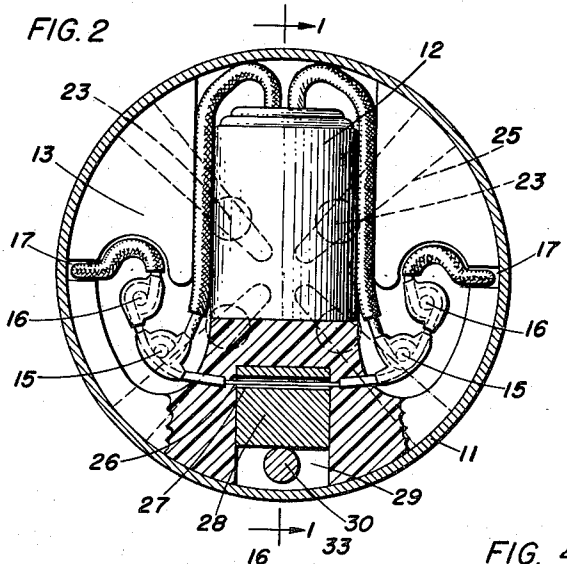


FIG. 3

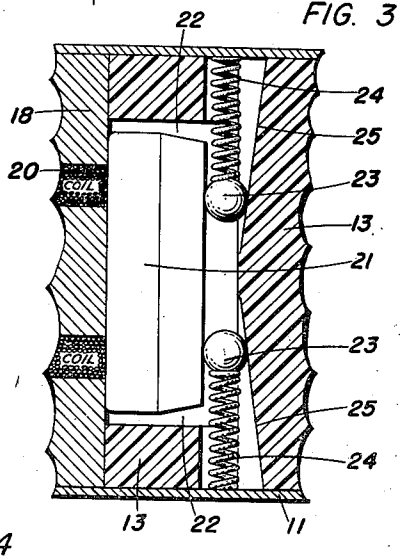
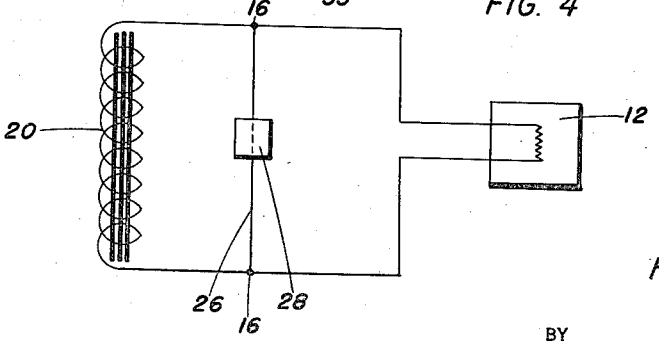


FIG. 4



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MAGNETIC DETONATOR

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1 Claim. (Cl. 102—70.2)

The present invention relates to magnetic detonators or impactors, of the type designed to be included in a fuze installed in an ordnance missile. The improved detonator, as a unitary part of the electrical fuze, is mounted adjacent the explosive charge of the missile, with its longitudinal axis substantially coincident with or parallel to the longitudinal axis of the missile.

In a fuze having the improved detonator an electrically energized primer is initially short-circuited with respect to the electrical output circuit of the magnetic detonator by a frangible conductor and mechanical detents are employed to hold the operating parts in safety or unarmed condition. Centrifugal forces developed by the spinning missile in flight are utilized to retract the detents, and the frangible conductor is broken as a result of centrifugal force, thereby removing the short on the primer. An electromagnetic generator having a movable armature is utilized, on impact of the projectile with its target, electrically to fire the squib.

In the accompanying drawings—

Fig. 1 is a detailed sectional view of a preferred embodiment of detonator in accordance with the present invention taken on line 1—1 of Fig. 2 and showing the interior parts in unarmed position, the large arrow in Fig. 1 indicating the direction of flight of the projectile in which the detonator is installed;

Fig. 2 is a transverse sectional view on line 2—2 of Fig. 1;

Fig. 3 is a fragmentary detailed sectional view showing detents securing the armature in a safe position; and

Fig. 4 is a schematic diagram showing an initially short-circuited primer coupled to the output circuit of the generator.

The detonator is enclosed within a cylindrical metal casing **11**, and includes an electrically energized primer **12** which is embedded in the front face of a molded plastic body **13**, which is located within the casing **11**, the front of the casing being closed by a metal plate **14**.

The wires from the primer are passed around and anchored on two pairs of posts **15—15** and **16—16**, which are embeded in the body, and from posts **16—16** the separate wires extend rearwardly through exterior grooves **17—17** and within the casing to the winding of an electromagnetic generator which fills the rear end of the casing.

The generator includes a soft steel yoke **18** having a transverse exterior groove **19** to accommodate the wires from the squib. An annular groove is provided in the plate for a coil or winding **20**. The armature **21** is a small circularly magnetized disk consisting, for example, of "Alnico" which covers the coil and clings to the yoke, as shown. The yoke and armature thus constitute a closed magnetic circuit. The armature is located in a round

recess **22** of ample size to permit separation of the armature from the yoke **18**.

The armature is mechanically held in unarmed position, and in close contact with the yoke, by four balls **23** each pressed inwardly along a cam groove **25** in the rear face of the body **13** by an individual radial spring **24**.

As best seen in Fig. 2 a fine work-hardened and frangible copper wire **26** is soldered to the two posts **15—15** to bridge a gap between the posts and thus short circuit the primer. This wire **26** passes neatly through a hole **27** in a radially arranged slide-block **28**, mounted to slide in a radial groove **29** provided therefor in the front portion of the body **13**.

The block **28** is held in unarmed position by means of a slide-bolt **30** which is pressed forward by a spring **31** to overlap the slide-block and impinge against a stop pin **32** mounted in the block. The slide-bolt slides through an opening in a wall portion **33** of the body **13**, which forms a stop for the bolt, after the latter is retracted.

In Fig. 1 the detonater is shown in unarmed position. When the projectile is fired from a gun, due to set-back forces then developed, the slide-bolt **30** is retracted to release the initially detained slide-block **28**. Centrifugal force of the spinning projectile throws out the released slide-block **28** thereby breaking wire **26**; and the same force retracts the detent-balls **23** from their positions in front of the armature.

Upon impact of the projectile against its target, armature **21** is projected away from the yoke, thereby decreasing the number of magnetic flux lines in the coil, and the resultant voltage therein induced causes an electrical surge current in the primer and detonation of the projectile.

What is claimed is:

A magnetic detonator for an ordnance missile, and comprising a yoke of magnetic material, a winding carried by said yoke, an armature coacting with said yoke to form therewith a normally closed magnetic circuit, with its magnetic flux interlinked with said winding, means mechanically holding the armature in contact with the yoke, said means being retractable by centrifugal force to release the armature and thus arm the detonator when spin occurs, said armature thereupon being held to the yoke solely by their mutual magnetic attraction, the surface of contact between the armature and the yoke being so oriented with respect to the direction of travel of the missile that upon impact inertial forces will cause the armature and yoke to separate suddenly, thereby generating a voltage in the winding, an electrically operable primer forming a circuit with the winding, means initially shortcircuiting the primer, means for breaking said short circuit including a member mounted to shift radially with respect to the missile, and means normally preventing such shift but movable by inertia when set-back occurs, to release the member, whereupon centrifugal force will cause the radial shift to take place, thereby breaking the short circuit when spin occurs.

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