

July 11, 1950

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2,514,359

PROXIMITY FUSE

Filed Dec. 28, 1945

Fig. 1.

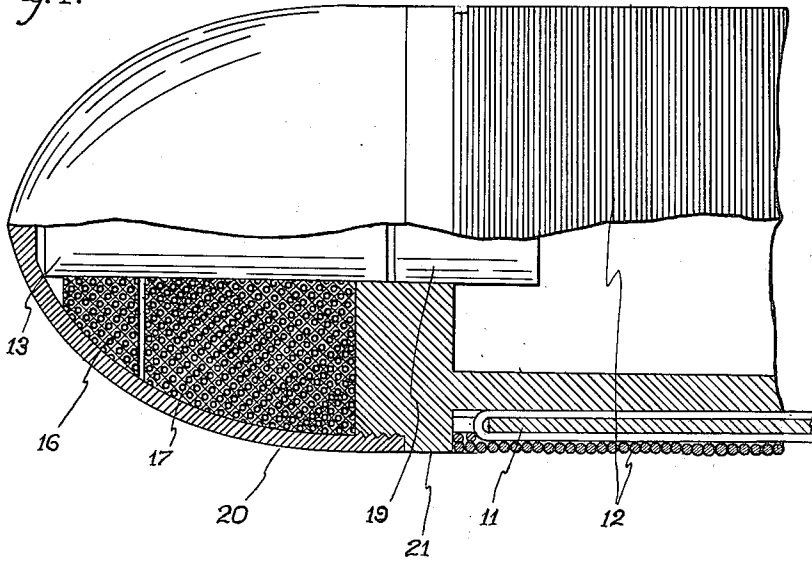
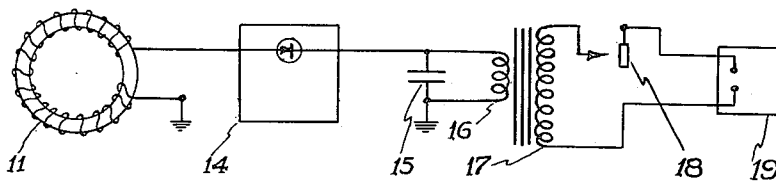


Fig. 2.



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2,514,359

PROXIMITY FUSE

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Application December 28, 1945, Serial No. 637,754

7 Claims. (Cl. 102-70.2)

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

1 This invention relates to projectile fuses and particularly to a fuse for detonating a projectile when proximate to a target, defined as proximity fuse.

One object of this invention is to provide a proximity fuse for use primarily in anti-aircraft projectiles.

Another object is to provide a proximity fuse which is simple, inexpensive and rugged in construction.

Another object of this invention is to provide a proximity fuse which is not subject to the defense of aluminum foil radar window.

Further objects and advantages of this invention, as well as the arrangement and operation, will be apparent from the following description and claims in connection with the accompanying drawing, in which,

Fig. 1 is a side elevation of the invention in partial broken section, and

Fig. 2 is a wiring diagram of this invention.

Fig. 1 shows a preferred form of this invention in which shell nose assembly 20 contains primary winding 16, and secondary winding 17, wound about rectifier, filter, and arming device housing 13.

Longitudinally mounted in the exterior surface of shell body 21 and extending over substantially the entire periphery thereof is an armature winding 11, which may be in the form of a ring armature wound on a cylindrical core and strapped or otherwise retained on the body 21 and against centrifugal force by silicon steel wire whipping 12.

Detonator 19 projects into the explosive space, and is adjacent to housing 13.

Fig. 2 shows the armature windings 11 connected to rectifier 14, thence to filter condenser 15 and to primary winding 16.

Secondary winding 17 connects to detonator 19 through arming device 18.

Rectifier 14, filter condenser 15 and arming device 18 are all mounted within housing 13.

In operation, spin imparted by the rifling to the fired projectile will cause a voltage to be induced in the armature windings 11 by interaction with the earth's magnetic lines of force. The resulting current being rectified, no voltage will result in secondary 17 from the uniform flow of direct current through the primary 16.

However, a rapid change in induced armature voltage will produce a transient effect in primary winding 16 and resulting voltage in secondary 17 will cause the detonator to function.

Such change in armature voltage will result from sudden variation in magnetic field through

2 which the projectile travels. Distortion of the earth's magnetic lines of force by a magnetic body will cause variation of the required nature. Aircraft are such magnetic bodies.

It is noted that distortion in the earth's magnetic field will occur also in the vicinity of the cannon from which subject projectile is fired, and if safety provisions were not incorporated detonation could occur in the vicinity of the muzzle.

Arming device 18 constitutes this safety provision in that it is inertia operated, so that during and immediately following acceleration of the shell through the barrel, the detonating circuit is broken at 18. However, upon completion of the positive acceleration or during the period of negative acceleration, contact will be completed at arming device 18, and detonation will be possible upon encountering the required distorted magnetic field.

It is also noted that centrifugal force generated by the rapid spin of the projectile, which spin is imparted by the rifling, will tend to pull armature windings 11 from the surface of the spinning projectile. Whipping 12, of silicon steel wire, will be retentive of the armature windings.

It is contemplated that armature windings 11 may be placed upon the interior periphery of shell body 21, by producing the body from non-magnetic steel, thus eliminating whipping 12.

It is understood that various modifications and changes may be made in this invention without departing from the spirit and scope thereof as set forth in the appended claims.

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

What is claimed is:

1. Electrical apparatus for detonating a rotatable missile adapted to be launched for movement through a medium containing a magnetic field, said missile having an explosive charge and firing means for said charge, said electrical apparatus comprising an inductor carried by the missile and rotatable therewith in the magnetic field for generating an alternating-current voltage of a predetermined magnitude corresponding to the intensity of magnetic field traversed by said missile, a transformer having primary and secondary windings for deriving an amplified voltage at the secondary winding to actuate said firing means, and a rectifier connected between said inductor and the primary winding of said

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transformer for rectifying said alternating-current voltage, whereby zero voltage is developed at said secondary winding except when the magnitude of said alternating-current voltage is changed from said predetermined magnitude in response to changes in intensity of said magnetic field.

2. Electrical apparatus for detonating a rotatable missile adapted to be launched for movement through a medium containing a magnetic field, said missile having an explosive charge and firing means for said charge, said electrical apparatus comprising an inductor carried by the missile and rotatable therewith in the magnetic field for generating an alternating-current voltage of predetermined magnitude corresponding to the intensity of the magnetic field traversed by said missile, a transformer having primary and secondary windings for deriving an amplified voltage at the secondary winding to actuate said firing means, a rectifier connected between said inductor and the primary winding of said transformer for rectifying said alternating-current voltage, whereby zero voltage is developed at said secondary winding except when the magnitude of said alternating-current voltage is changed from said predetermined magnitude in response to changes in intensity of said magnetic field, and filter means connected to said rectifier for canceling any alternating current components in said rectified voltage.

3. The electrical apparatus defined in claim 1 further comprising inertia switch means connected to said secondary winding for preventing detonation during periods of positive acceleration of said missile.

4. Apparatus for detonating a missile having an explosive charge and firing means for said charge, said apparatus comprising inductor means carried by the missile and movable with said missile in the earth's magnetic field for generating a varying-current signal of a predetermined magnitude corresponding to the intensity of magnetic field traversed by said missile, amplifying means responsive to varying-current signals only for deriving an amplified current signal adapted to actuate said firing means, and rectifying means connecting said inductor means and said amplifying means for rectifying said varying-current signal, thereby rendering said amplifying means operative only when the magnitude of said varying-current signal is changed from said predetermined magnitude in response to changes in intensity of said magnetic field.

5. Apparatus for detonating a missile having an explosive charge and firing means for said charge, said apparatus comprising an inductor on the missile and movable therewith in the

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earth's magnetic field for generating a varying-current signal of a predetermined magnitude corresponding to the intensity of magnetic field traversed by said missile, variable-current-responsive amplifying means connected to said inductor and adapted to provide an amplified current signal for actuating said firing means, and means coupled between said inductor and said amplifying means for transforming said varying-current signal into a unidirectional signal, thereby rendering said amplifying means inoperative to provide said amplified current signal except when the magnitude of said varying-current signal is changed from said predetermined magnitude in response to changes in intensity of said magnetic field.

6. In combination, a rotatable explosive projectile, an induction coil rotatable with said projectile and in a magnetic field for generating a varying current of magnitude proportional to the intensity of said field, means including a rectifier for deriving, from said varying current, a unidirectional current normally of substantially constant magnitude, amplifying means connected to said rectifier and adapted to provide an amplified current output only in response to alterations in magnitude of said unidirectional current, and means responsive to said amplified current for detonating said projectile.

7. In combination, a rotatable explosive projectile having an elongated body, an induction coil wound on the peripheral portion of said body and adapted to be rotatable with said projectile and in a magnetic field for generating a varying current in accordance with the intensity of said field, means including a rectifier for transforming said varying current into a unidirectional current normally of substantially constant magnitude, amplifying means connected to said rectifier and adapted to provide an amplified-current output in response only to alterations in magnitude of said unidirectional current, and means responsive to said amplified-current output for detonating said projectile.

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