Feb. 10, 1959 R. D. HUNTOON 2,872,867

ORDNANCE CONSTRUCTION

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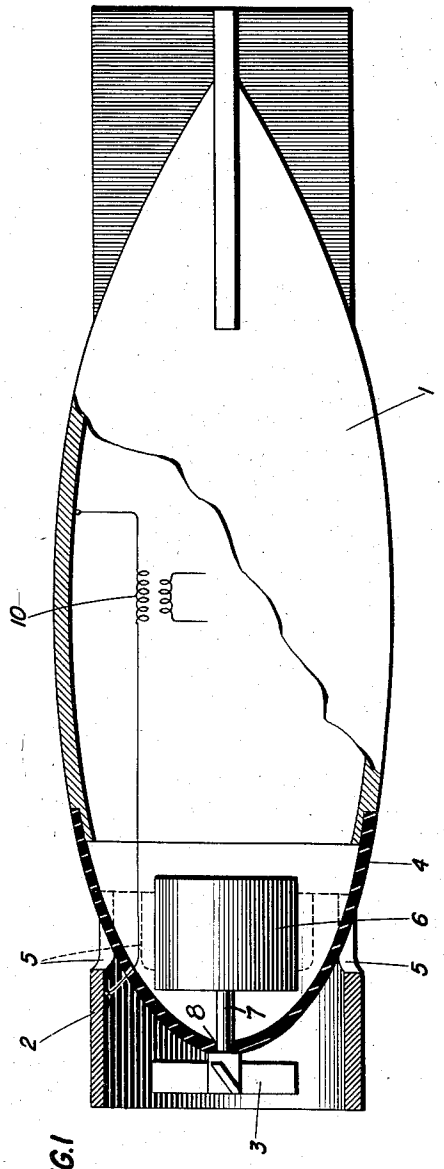


FIG. 1

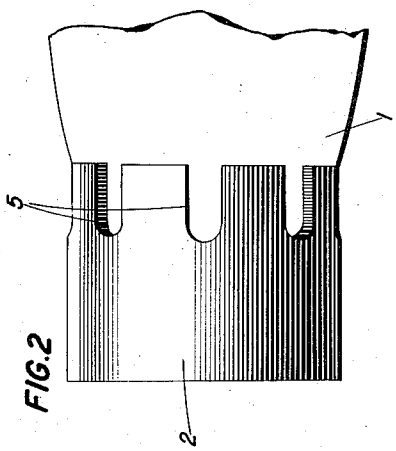


FIG. 2

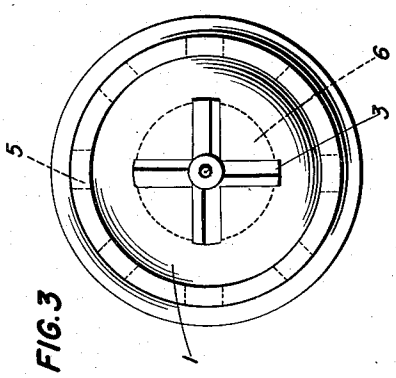


FIG. 3

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ORDNANCE CONSTRUCTION

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8 Claims. (Cl. 102—70.2)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The present invention relates to items of explosive ordnance, and particularly to proximity firing devices utilizing high frequency radiation and powered by wind-driven generators. Difficulty has arisen in the operation of aerial bombs equipped with such firing devices due to electrical fluctuations or unwanted impulses developed by the spinning propeller of the wind-driven generator. These impulses make effective control of such firing means difficult, and have resulted in unwanted detonations. It appears as a result of my investigation of this phenomenon that the difficulty is probably due either to rapid variations of capacitance resulting from bearing play, or to the fact that the propeller blades cut the flux lines of an asymmetrical field in the vicinity of the nose feed system.

The present invention aims to overcome the indicated difficulties by means which virtually eliminate the electric field from the vicinity of the propeller blades, and at the same time provide an effective counterpoise portion adapted to form a part of an antenna system.

Another object of the invention is to provide such an improved shielding device which is symmetrical in its mechanical design, so that it may be installed upon a bomb without impairing the flight characteristics thereof, and which in addition, provides a blunt nose effect by which the accuracy of flight is actually improved.

Other objects and advantages will become apparent during the course of the following description taken in conjunction with the drawings forming a part hereof.

In the drawings:

Fig. 1 is a view partly in side elevation and partly in substantially diametrical longitudinal section of a bomb constructed in accordance with the present invention, certain of the electrical components being indicated schematically;

Fig. 2 is a fragmentary side elevational view of the nose portion of the bomb; and

Fig. 3 is a front elevational view thereof.

Referring now to the drawings, reference character 1 designates the body of the bomb, which is illustrated as of conventional shape and the details of which, forming no part of my present invention, are not shown. The exciting means is conventionally illustrated by the transformer, 10, the secondary of which is connected at one end to the bomb body, 1, and at the other end to the cylindrical shield, 2, which extends forwardly of the nose of the bomb in coaxial position, being open at its forward end and encircling the propeller, 3, by means of which the generator, 6, is driven. It will be understood that the generator powers the exciting means through the agency of intermediate apparatus which, since it forms no part of the present invention, is not illustrated.

The shield, 2, is insulated from the body of the bomb by means of bomb nose cap portion, 4, which is formed of insulating material. At the rear end of the shielding cylinder, air outlet openings, 5, are provided. The propeller shaft 7 which couples the propeller 3 to a generator

6 is journalled at its forward end in a bearing 8 in the nose cap portion 4.

It will be appreciated that by virtue of the presence of the shield 2, the propeller turns in a space which is virtually field-free. Unwanted or parasitic generation by the propeller blades is accordingly prevented. By virtue of the mechanical symmetry of the arrangement, and the blunt nose imparted by the shield, stability of flight of the bomb is actually improved rather than hampered.

In the operation of proximity firing devices utilizing high frequency radiation some form of power supply is necessary. For this purpose batteries may be used. However, for freely falling bombs and the like a wind driven generator has been found to be preferable. In such construction the propeller is ordinarily mounted at the nose of the bomb and is rotated by the wind resulting from the bomb's passage through the air. The propeller may drive a suitable generator by any desired means which forms no part of this application and may be connected to suitable means for employing high frequency radiation for proximity firing purposes.

Any suitable means may be used for generating the high frequency radiation. This means may be the usual radio transmitter operating on the principle that as the body bearing the generator approaches an inductor a change occurs in the intensity of the plate current of the generator. This change may be used to trigger a primer which in turn explodes the bomb.

Waves radiated from the transmitter by means of a suitable antenna such as the surface of the bomb strike the target and are reflected back along the path of propagation. As the generator moves toward the target the phase of the reflected wave with respect to the emitted wave changes so that it is in phase at one instant and out of phase the next. The result of this change in reflected wave interference is to cause a ripple in the plate current which increases in intensity as the target is approached. By proper adjustment the circuit can be set to fire the primer on any of these ripples and thus at any desired distance from the target.

All of the above is common knowledge and not a part of the invention claimed herein. However, the present construction becomes of importance in the elimination of undesired triggering of a circuit and it has been discovered that the cause of this undesired triggering is electrical variations induced by the rotation of the propeller which in turn modulates the electrical field thereabout.

To employ any type of simple shields such as is shown in the prior art would interfere with the air flow characteristics of the bomb's external contour and, accordingly, the present invention is directed to the provision of a new and improved effective electrical shield arrangement which will not materially alter the air foil characteristics of the projectile to which it is secured or cause deviation of the bomb or other projectile from the intended course. Applicant has secured the desired freedom from electrical interference by using the cylindrical forwardly extended shield 2 disposed around the propeller 3 as the nose conducting portion of the high frequency antenna.

It will be apparent that in addition to the above electrical shielding the present arrangement provides an effective mechanical protection for the propeller and in addition serves to collimate the air flow and provides a cowling to concentrate this air flow past the blade so as to secure the most effective rotation of the propeller blade.

The invention herein described 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.

I claim:

1. A bomb construction comprising a metallic body, an insulating nose portion attached thereto, a tubular metallic shield carried by said nose portion and insulated thereby from the body, a generator in said nose portion, generator driving means including a rotor rotatable in said shield, and exciting means powered by said generator and having output portions connected to said body and to said shield.

2. A bomb comprising a metallic body, an insulating nose portion attached thereto, a tubular metallic shield carried by said nose portion, a generator in said nose portion, and a propeller located within said shield for driving the generator.

3. A bomb construction comprising a metallic body, an insulating nose portion attached thereto, a tubular metallic shield carried by said nose portion, a generator in said nose portion, a propeller for driving said generator in said shield, and exciting means powered by said generator for establishing an electrical field between said tubular metallic shield and said metallic body.

4. An antenna for an explosive missile comprising, a conducting body portion, a non-conducting nose portion having mounted thereon a conducting ring, and a propeller mounted inside said conducting ring shielded from the influence of the antenna field existing between said conducting ring and said body portion.

5. An antenna for an explosive missile comprising, a conducting body portion, a non-conducting nose portion having mounted thereon a conducting ring, a propeller mounted inside said conducting ring and driving a prime mover for exciting a radiation generator whereby an electric field is established between said conducting ring and said body portion that is free from propeller microphonics.

6. In combination with a bomb having a metallic body and a propeller projecting substantially axially from one end thereof, electrical shielding means also mounted symmetrically with respect to said metallic body and substantially surrounding said propeller, said shielding means insulated from said metallic body, and high frequency exciting means connected to said metallic body and to said shielding means.

7. A bomb construction comprising a metallic body, an insulating nose portion attached thereto, a tubular metallic shield carried by said nose portion, a generator in said nose portion, a propeller within said shield for driving said generator, an exciting means powered by said generator for establishing an electric field between said tubular shield and said metallic body, said propeller being shielded from said electric field by said tubular shield to prevent said propeller from producing unwanted variations in said electric field.

8. A bomb construction comprising a metallic body, an insulating nose portion attached thereto, a tubular metallic shield carried by said nose portion, a generator in said nose portion, a propeller within said shield for driving said generator, a bearing in said nose portion, a shaft on said propeller mounted in said bearing in said nose portion, an exciting means powered by said generator for establishing an electric field between said tubular shield and said metallic body, said propeller and said bearing being shielded from said electric field by said tubular shield to prevent said propeller and said bearing from producing unwanted variations in said electric field.

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