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FLYWHEEL FOR GENERATOR IN ORDNANCE MISSILE

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Fig. 1.

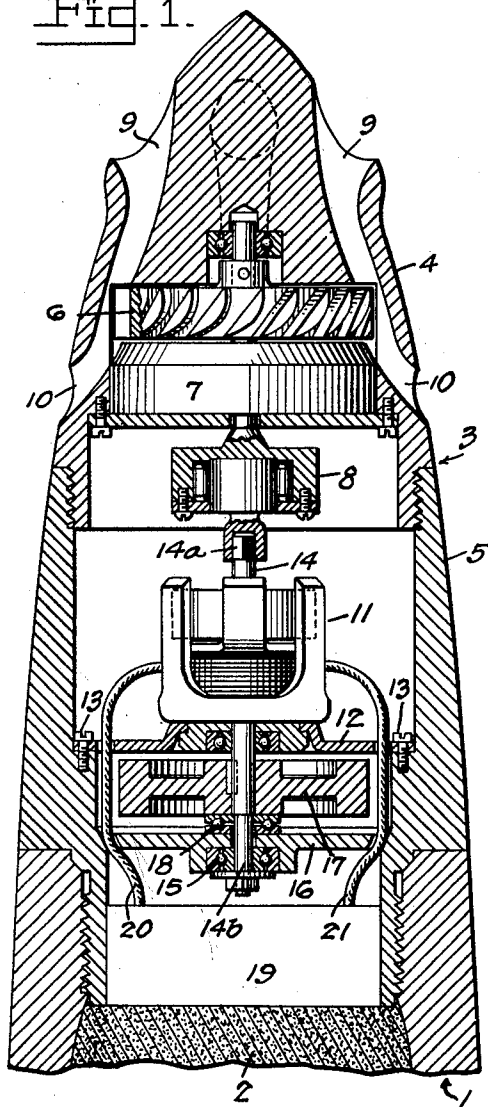
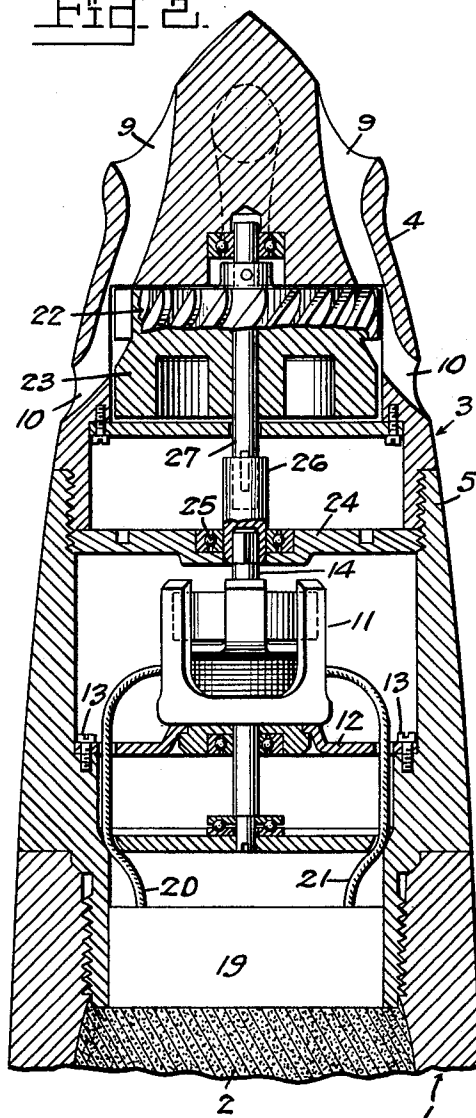


Fig. 2.



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FLYWHEEL FOR GENERATOR IN ORDNANCE MISSILE

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2 Claims. (Cl. 102-70.2)

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

The invention described in the specification and claims may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to wind driven generators and more particularly to a wind driven generator for use with an electric or electronic fuse.

Various types of ordnance missiles are provided with electric or electronic fuses which are sensitive to approach to a target. Such fuses require that a constant electric current be furnished during the period when the fuses are to be in sensitive condition. Common types of batteries have been found unsuited for this purpose because they become relatively inactive at low temperatures. Reserve type batteries, designed for low temperature operation, are not completely satisfactory due to the time required for them to become activated. Generators provided with wind vanes or air driven turbines have been used and have given satisfactory performance. The missiles, provided with the aforementioned fuses and generators, are sometimes caused to pass briefly through the stratosphere which results in the generator speed being decreased and the fuse placed in unarmed or insensitive condition during the travel through the stratosphere. It is a primary object of the invention to maintain the fuse in armed condition throughout the flight of the missile and so rendering the missile effective against any targets which it encounters, whether the targets are met before the missile has left the troposphere, or are met in the stratosphere, or are met after reentry of the missile into the troposphere.

The specific nature of the invention as well as the other objects and advantages thereof will clearly appear from the following description and accompanying drawings in which:

FIGURE 1 is a longitudinal cross section of the head of a fused projectile embodying the invention;

FIGURE 2 is a view similar to that of FIGURE 1 but showing a modification of the invention.

The invention consists of incorporating into the turbine-generator type of system an inertia member of such design as to provide power to drive the generator during the period when the missile is in the stratosphere. This may be done in a variety of ways, several of which are specifically disclosed herein, but it is not intended that the scope of the invention be limited to the embodiments disclosed herein.

FIGURE 1 of the drawing shows a missile 1 having a high explosive charge 2 in the body thereof and a nose member affixed to the body. The nose member 3 is divided into two hollowed members which comprise a cap 4 and a body 5. The cap 4 has rotatably mounted therein an air driven turbine 6. The air intake orifices and exhaust ports formed in the cap member are indicated by the reference numerals 9 and 10, respectively. An electrical generator 11 is mounted on a flange 12 which is secured inside of the body 5 as indicated by 13. The generator shaft 14 has one end 14a, coupled to the clutch 8 in any convenient manner and its opposite end 14b supported by means of bearing 15 mounted in the base plate 16 of the body 5. A flywheel 17 is mounted on the shaft 14 intermediate the flange 12 and

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base plate 16. The thrust bearing for the flywheel is indicated by 18. The electronic target responsive element and detonator of the fuse are contained in a housing 19 which is fixed in the housing 5 adjacent the explosive charge 2 in the body of the missile. Leads 20 and 21 connect the output of the generator 11 to the electronic components. As it is desirable to have the generator come up to operating speed in the shortest possible time, the turbine is geared to the generator through a gear train contained in gear box 7 to provide greater torque, so that the initial inertia of the flywheel may be more easily overcome. A clutch 8 couples the gear train with the generator shaft 14, the purpose of which is to remove the load of the gear train from the generator shaft when the rotational power is being supplied to the generator by the flywheel.

FIGURE 2 illustrates another form of the invention wherein a turbine 22, used to drive the generator, is designed to have more mass than would otherwise be desirable. The mass in this instance being incorporated, in so far as possible, near the periphery of the turbine in order to afford the greatest obtainable mechanical advantage when the rotational energy stored in the turbine takes over the task of causing the generator to rotate. It will be evident, upon examination of FIGURE 2, that the turbine is so designed as to constitute both a turbine and a flywheel. In the figure, a turbine 22 having formed integrally therewith an inertia member 23 is rotatably mounted in the cap 4 of the nose 3. A partition 24 positioned in the body 5 of the nose member is centrally apertured to receive a bearing 25 having fixed therein a coupling sleeve 26 which couples the shaft 27 of the turbine to the generator shaft 14.

In operation, when the missile is being projected or released, air will flow through the intake orifices to rotate the turbine and thus energize the generator to render the target responsive element operative as well as store energy in the inertia element affixed to the generator shaft or formed integrally with the turbine. If desired, the inertia element may also be formed integrally with the armature of the generator. During the period of the missile's travel through the troposphere, the generator is rotated by the turbine due to air pressure on the blades of the turbine. However, when the missile enters the stratosphere the air pressure on the turbine is substantially or entirely eliminated, whereupon the energy stored in the flywheel during the missile's travel through the troposphere is released to the generator causing its armature to continue in rotation and thereby maintaining the target responsive element operative during the missile's period of travel through the stratosphere.

It will be apparent that the embodiments shown are only exemplary and that various modifications can be made in construction and arrangement within the scope of the invention as defined in the appended claims.

I claim,

1. In a missile having a target responsive electronic fuse and an electric generator adapted to power said fuse, improved air-responsive means therein for driving said generator which will rapidly bring said generator up to operating speed and also provide sufficient generator speed to maintain said fuse sensitized during missile travel through the stratosphere, said improved means comprising in combination: an air driven turbine mounted in the nose of said missile, a gear train connected to said turbine to increase its effective starting torque, a flywheel mounted on the shaft of said generator, and a clutch coupling the output of said gear train to the shaft of said generator, said air driven turbine imparting a rapid initial rotation to said generator and flywheel by means of said gear train, and said flywheel maintaining the

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speed of said generator during missile travel through the stratosphere, said clutch being adapted to remove the load of said gear train from the shaft of said generator when the generator rotational power is being supplied by said flywheel.

2. In a missile having a high explosive charge, a target responsive electronic fuse, and an electric generator adapted to power said fuse, improved air-responsive means within said missile for driving said generator which will rapidly bring said generator up to operating speed and also provide sufficient generator speed to maintain said fuse sensitized during missile travel through the stratosphere, said improved means comprising in combination; a nose member affixed to the body of said missile, said nose member having a hollow cap at its forward end, an air driven turbine rotatably mounted in said cap, said cap having air intake orifices at its forward end and exhaust ports at its rearward end, said turbine being so constructed and arranged in cooperation with said intake orifices and exhaust ports that during missile flight in the troposphere air entering

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at said intake orifices and leaving at said exhaust ports causes rotation of said turbine, a flywheel mounted on the shaft of said generator, a gear train through which said turbine is coupled to said generator so that the initial inertia of said flywheel is more easily overcome, and a clutch interposed between said flywheel and said gear train, said clutch being adapted to remove the load of said gear train from the shaft of said generator when the generator rotational power is being supplied by said flywheel.

References Cited by the Examiner

UNITED STATES PATENTS

15	2,468,120	4/49	Senn	-----	102-70.2
	2,511,872	6/50	Parker	-----	102-70.2
	2,681,008	6/54	Allen	-----	102-70.2
	2,699,543	1/55	Naumann et al	-----	102-70.2

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