July 4, 1961 A. S. CLARKE 2,990,776

WIND DRIVEN GENERATOR

Filed Nov. 17, 1949

Fig. 2.

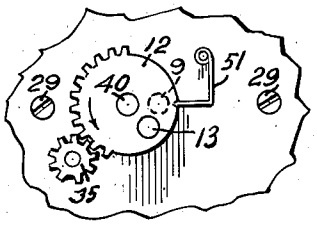


Fig. 6.

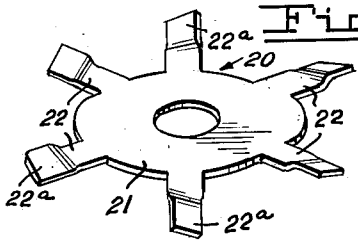


Fig. 1.

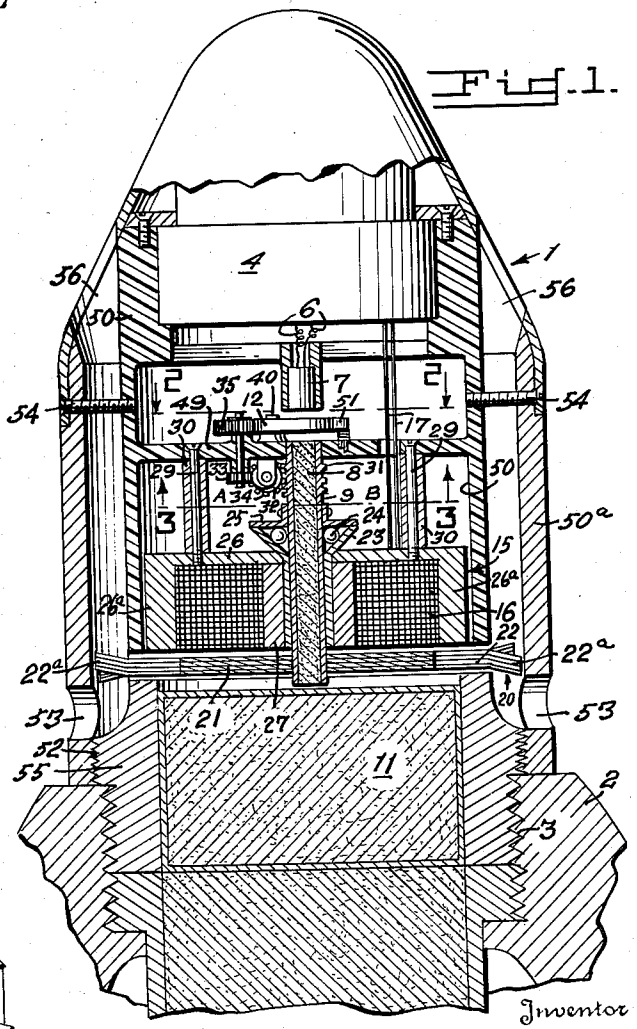


Fig. 3.

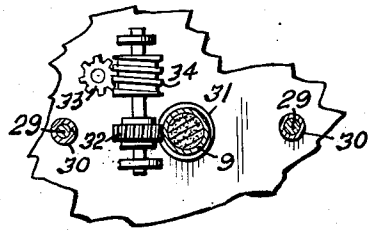


Fig. 4.

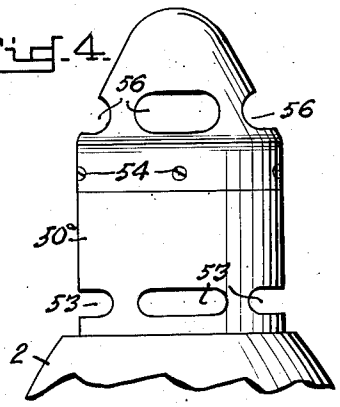
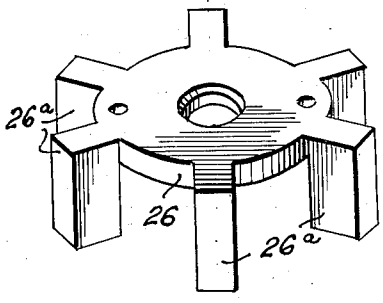


Fig. 5.



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WIND DRIVEN GENERATOR

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2 Claims. (Cl. 102—70.2)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein 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 alternating current generator for use with an electric fuse.

Modern electric fuses, such as proximity fuses, electric time delay fuses, etc., require a built-in source of electric power to actuate the fuse. One known device for providing such power is a small generator driven by a wind vane which is energized by the forward motion of the fused projectile. Such an element is generally employed with low velocity projectiles, such as bombs, rockets, and mortar shells. An example of such an element is shown in the U.S. Patent to Senn, No. 2,468,120. My invention consists primarily in the provision of an integral armature rotor and turbine blade, thus providing a simple rigid and inexpensive construction. Another feature of my invention is a safety arming system wherein part of the powder train is carried through the generator shaft which is made hollow for this purpose.

The specific nature of the invention as well as other objects and advantages will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

FIG. 1 is a longitudinal cross section view of the head of a fused projectile embodying my invention;

FIG. 2 shows a sectional detail of the delay arming mechanism of the fuse shown in FIG. 1;

FIG. 3 shows a similar view taken along line 3—3 of FIG. 1 of the gear reduction train which drives the delayed arming mechanism;

FIG. 4 is a detailed view showing the arrangement of the air intake ports and the exhaust outlets;

FIG. 5 is a detail view showing the magnetic pole structure of the generator, and

FIG. 6 is a perspective view of the combined armature and wind vane.

Referring to FIG. 1 the electric fuse is generally indicated at **1**, being fastened to the nose of the projectile **2** by a screw threaded connection indicated at **3**. This fuse may be of any type requiring electric power but is indicated for the purpose of illustration as any known type of proximity fuse containing in or near the nose thereof a target responsive element **4**, the details of which are not material to my invention. Target responsive element **4** is connected by leads **6** to a squib **7** which is thereby ignited when the target responsive element senses the proximity of a target in a known fashion. When the fuse is armed, ignition of squib **7** will fire tetryl charge **8** in hollow shaft **9** to thereby set off tetryl booster **11** and thus explode the projectile.

To supply electrical energy for the target responsive element, a generator **15** is provided having a stationary winding **16** from which leads **17** extend to the target responsive element.

A hollow shaft **9** has fixed thereto the laminated iron discs **21** which are formed with radially extending fingers **22**. Shaft **9** is journaled in a shell bearing **23** which is preferably made of oil impregnated bronze axially restrained by means of the ball thrust bearing **24** and ring

25 cooperating therewith. A soft iron disc **26** of appreciable thickness is provided with peripherally spaced downwardly projecting fingers **26***a*, equal in number to the fingers **22**, which form retaining means for the armature winding **16** as well as magnetic poles cooperating with the poles **22***a* of the rotor **20**. With reference to FIGURE **1**, the armature winding **16** surrounds the central ring **27** which is in close contact with the disc **26**. The disc **26** is made of a highly permeable magnetic material such as Alnico.

Prior to insertion of the winding **27** in the annular space formed by the shaped disc **26**, fingers **26***a* and ring **27**, the disc is mounted on the fuse body by means of a plurality of screws **29** extending through spacer tubes **30**. The magnetic circuit from the fingers **26***a* of the stator to the rotor **20** is through the spaced fingers **22**. The rotation of the latter at high speed will produce therefore, an approximately square topped wave form in the armature winding **27** which is connected to a load within the projectile. The rotor shaft **9** is preferably driven by means of turbine blades formed by bending of the fingers **22**, or by employing a moulded turbine rotor integrally formed with said fingers. Space A may be used for rectifiers or other components of the fuse while space B may house the interrupter gearing for the arming and self destruction switch. These details are well known, and as they form no part of my invention they are not further described.

In FIGS. 2 and 3 additional details of the components associated with the generator are shown. These comprise a gear train rotated by the shaft **9** for aligning a tetryl-filled bore **13** in gear **12** with the shaft **9** which is also tetryl-filled and squib **7** for firing the main tetryl booster charge **11** thereby. The gear train from shaft **9** includes in order the gears **31**, **32**, **34**, **33**, **35**, and **12**, the latter being journaled on a shaft **40** which is mounted in the support **49** fixed to the inner cylindrical wall **50**. A spring detent **51** locks the disc **12** in firing position when the necessary rotation of the latter has been accomplished to arm the fuse.

The elements above described are inclosed in casing **50** which may be of plastic or any other suitable material. Screwed to casing **50** as by screws **54** is an outer casing **50***a* which thereby provides an annular air passage between casing **50** and **50***a*. A series of apertures or ports **53** are provided in casing **50***a* to serve as exhaust ports for air passing down this annular channel or passageway. Casing **50***a* is attached to the lower portion of the fuse **55** as by screw threaded connection shown at **52**.

The operation of the device will now be clear. Upon the projectile being discharged or released air will flow through annular intake orifice **56** to rotate vanes **22***a* and thus energize the generator to render the target responsive element operative. At the same time shaft **9** through the associated reduction gearing will slowly rotate gear **12** from the unarmed into the armed position so that after a safe distance has been traversed the fuse is armed and ready for operation.

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 my invention as defined in the appended claims.

I claim:

1. An electric fuze for ordnance projectiles, a wind driven generator for said electric fuze comprising a substantially cylindrical casing adapted to be propelled at high speed along the axis thereof, the advance portion of said casing structure having a central nose section and an outer annular section spaced therefrom; means providing an interior annular passageway having an annular inlet opening between said nose section and said outer

annular section, outlet openings at the rear of said annular passageway; a generator journaled coaxially with said annular passageway; a rotatable armature for said generator; wind vanes integral with said armature and extending into said annular passageway; a shaft for said armature, said shaft being hollow and open at both ends, a booster charge adjacent the rearward end of said shaft, and a squib adjacent the forward end of said shaft.

2. An electric fuze for ordnance projectiles, a wind driven generator for said electric fuze comprising a substantially cylindrical casing adapted to be propelled at high speed along the axis thereof, the advance portion of said casing structure having a central nose section and an outer annular section spaced therefrom; means providing an interior annular passageway having an annular inlet opening between said nose section and said outer annular section, outlet openings at the rear of said annular passageway; a generator journaled coaxially with said annular passageway; a rotatable armature for said generator; wind vanes integral with said armature and extending into said annular passageway; a shaft for said armature, said shaft being hollow and open at both ends, a booster charge adjacent the rearward end of said shaft, and a squib adjacent the forward end of said shaft; a rotary powder train interrupter, said interrupter driven by said shaft and having an interrupting member disposed between said squib and said shaft and actuated from initial safe position to an ultimate armed position by rotation of said shaft.

References Cited in the file of this patent

UNITED STATES PATENTS

2,468,120	Senn	Apr. 26, 1949
2,484,206	Clark	Oct. 11, 1949

FOREIGN PATENTS

304,254	Germany	Oct. 1, 1920