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PROJECTILES FITTED WITH AN ELECTRIC GENERATOR OF THE INERTIA TYPE

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Fig. 1.

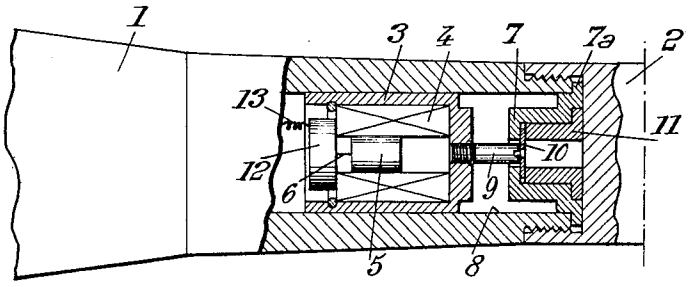
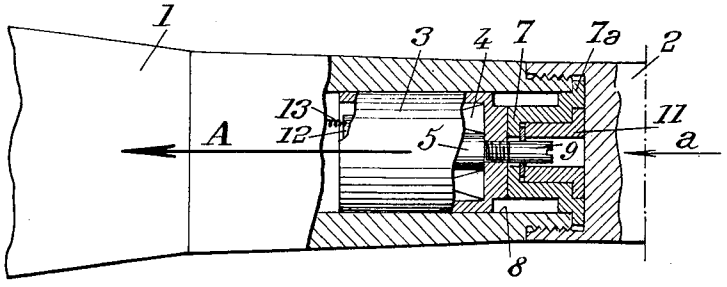


Fig. 2.



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PROJECTILES FITTED WITH AN ELECTRIC GENERATOR OF THE INERTIA TYPE

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4 Claims. (Cl. 102—70.2)

The present invention relates to projectiles fitted with an electric generator of the inertia type. Such a generator is a device capable of producing an electric current of short duration by an induction effect resulting from a relative displacement of two elements movably mounted with respect to each other, under the effect of an acceleration imparted to one of them and transmitted through it with some delay to the other. Such a generator is generally intended to charge a voltage source, such as a capacitor, capable of igniting, when the projectile strikes a target, the explosive charge of the projectile. The invention is more especially but not exclusively concerned with projectiles undergoing, when launched, relatively low accelerations, which is the case in particular of rockets (accelerations ranging from 100 to 200 g.), grenades, either self-propelled or not, launched by means of a rifle (accelerations ranging from 1,000 to 2,000 g.), as compared with projectiles such as shells, for which the initial acceleration may be as high as 100,000 g.

The object of this invention is to provide a projectile of this kind which is better adapted to meet the requirements of practice than those known up to the present time and in particular concerning the reliability of operation of the electric generator thereof.

According to the invention, the generator is mounted movable in the projectile body so that, when the projectile is launched, the generator can have, in said body, a relative rearward displacement of non-negligible amplitude from a position where it is held, at rest, by holding means frangible under the effect of the acceleration imparted to said body upon launching, to a rear position where it is applied against a rear abutment of said body, whereby, when the projectile is launched, the generator holding means yield immediately and said generator, lagging by inertia with respect to the projectile body, is struck by said rear abutment when the projectile has already gathered speed so that the acceleration then imparted to said generator is considerably higher than the acceleration initially imparted to said projectile when it was launched.

A preferred embodiment of the present invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example and in which:

FIG. 1 is a side view, with parts cut away and parts in cross section, of a grenade made according to the invention, the parts occupying the positions they have in the state of rest.

FIG. 2 is a similar view, the parts being in the positions they occupy immediately after the grenade has been launched.

The projectile shown by the drawings comprises, at the front, a warhead 1 and, toward the rear, a tubular extension 2 for fitting the grenade on a rifle. The ignition device of this projectile comprises a circuit including a closing contact actuated upon impact on a target and a voltage source, for instance a capacitor, charged, when the projectile is being launched, by an inertia generator carried by the projectile.

FIG. 1 shows the construction of this generator 3. It comprises a coil 4 disposed coaxially with the projectile and along the axis of which can move, in the rearward direction, a bar magnet 5 held in forward position, before the projectile is launched, by frangible means such as a rigid wire 6, which permits transporting the projectile without risks in case of its being dropped but is sufficiently weak to break under the effect of an axial acceleration greater than a given value (hereinafter called "critical acceleration") imparted to generator 3 and directed frontwardly.

In known projectiles of this type, the inertia generator 3 was rigidly mounted in the projectile body and therefore was subjected, upon launching, to the same acceleration as the projectile, which acceleration is relatively low in the case of a grenade.

For reasons of safety, the critical acceleration was chosen relatively close to this initial acceleration so that there were risks of misfire because the initial acceleration of the projectile was not much higher than the critical acceleration.

The object of the present invention is to overcome this drawback.

For this purpose, according to this invention, generator 3 is movable in the projectile body from a forward position (shown by FIG. 1), in which it is held before launching by frangible means capable of yielding under the effect of the initial acceleration of the projectile, to a rear position (shown by FIG. 2) where said generator is applied against a rear abutment 7 of the projectile body.

Thus, when the projectile is launched, the initial acceleration a it undergoes breaks the above mentioned frangible means and generator 3 remains, due to its inertia, substantially stationary for a very short time, until abutment 7 strikes it and instantaneously transmits its speed thereto, thus giving it an acceleration A much higher than a.

It is thus possible to make the frangible means 6 of bar magnet 5 much stronger (the only condition being that the critical acceleration must be substantially smaller than the acceleration A produced when abutment 7 strikes generator 3) so that the safety obtained for transportation of the projectile is increased.

The casing of generator 3 is made in the form of a piston slidable in a cylindrical housing 8 formed in the projectile body between warhead 1 and the rear extension 2.

The rear abutment 7 consists of a kind of hollow plug the front face of which constitutes the abutment proper, this plug being kept in position by means of its flange 7a caught between the projectile body and the rearward extension 2 thereof.

The holding means for keeping generator 3 in forward position ahead of abutment 7 comprise a screw 9 the head of which consists of a frangible disc 10 secured in the hollow plug forming abutment 7 by means of a locking sleeve 11 fixed in the plug.

The capacitor which forms the voltage source and is to be charged by generator 3 is mounted in a casing 12.

Between the unit formed by generator 3 and this voltage source on the one hand and the electrical igniting means on the other hand, there is provided a flexible connection consisting for instance of a wire 13.

The operation of the projectile shown by the drawings is as follows:

Before launching, generator 3 is held by screw 9 and disc 10 in the position of FIG. 1. When the projectile is launched, the initial acceleration a causes disc 10 to be sheared off and generator 3 remains practically stationary (screw 9 sliding in sleeve 11) until abutment 7 strikes generator 3 (position shown by FIG. 2), thus imparting to said generator an acceleration A considerably

greater than the initial acceleration *a*. Wire 6 is then broken and bar 5 slides rearwardly with respect to coil 4.

It should be noted that if the grenade were provided with a movable element, such for instance as an auxiliary propelling device, slidable with respect thereto and suddenly driven along by said grenade a very short time after launching, the generator might be carried by said movable element so as to have the benefit of a shock producing a high forward acceleration.

In a general manner, while I have, in the above description, disclosed what I deem to be a practical and efficient embodiment of my invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. In a projectile, the combination of a rigid body and an electric generator in said body, said generator comprising a first and a second element capable, by a relative movement with respect to each other, of producing an electric current, said first element being slidable in said body along the line of movement of said projectile, first frangible means between said first element and said body for yieldably opposing rearward displacement of said first element relative to said body, said body having a rigid abutment for said first element rearwardly thereof, said second element being slidable rearwardly with respect to said first element along the line of the movement of said projectile, and second frangible means

mounted between said two elements for yieldably opposing rearward displacement of said second element with respect to said first element, said first frangible means yielding in response to the initial acceleration of said projectile and said second frangible means yielding in response to the acceleration imparted to said first element by said rigid abutment.

2. A combination according to claim 1 in which said body forms a cylindrical housing having its axis parallel to the direction of movement of the projectile, said first element being in the form of a piston slidable in said housing.

3. A combination according to claim 1 in which said abutment is a hollow plug fixed in said body.

4. A combination according to claim 1 in which said abutment is a hollow plug fixed to the rear of said body, said first frangible means comprising a screw fixed to the rear of said first element and extending rearwardly through said plug, a frangible disc carried by the end of said screw located on the rear side of said plug. and means for holding said disc against the rear wall of said plug.

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