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MINIATURE DISAPPEARING PROJECTILE

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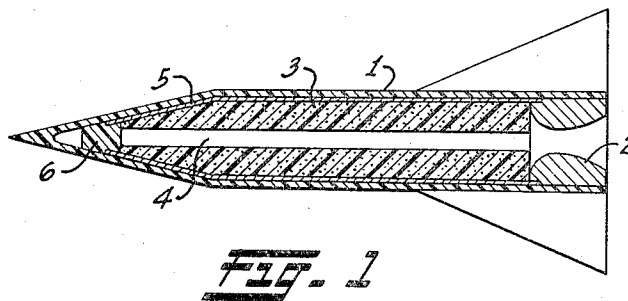


FIG. 1

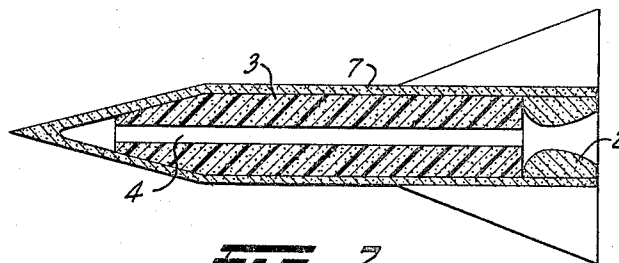


FIG. 2

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MINIATURE DISAPPEARING PROJECTILE

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5 Claims. (Cl. 102—49.3)

This application is a continuation-in-part of application Ser. No. 140,090, filed Sept. 22, 1961, and entitled, "Miniature Disappearing Projectile," and now abandoned.

This invention relates to disappearing miniature rocket projectiles.

Miniature solid propellant rockets have application as anti-personnel weapons, fired either singly or in large numbers. Sail miniature rockets can be formed to extremely small size such as with a diameter within the range of 1.5 to 3 millimeters and a length within the range of 8 to 35 millimeters. Because of their high speed such projectiles are very effective, though small. Rockets of the type intended to be included within this invention are self-propelled rockets in which the burnable propellant is confined within a casing having a nose piece forming one end thereof and a nozzle confining the rearward end through which the flame and combustion gases from the burning propellant pass.

To hinder examination of such rockets by an enemy after the rocket has been fired and also to add a psychological factor to the effectiveness of the weapon, it would be desirable to have the rockets vanish at the end of their trajectory or after impact.

Two methods for accomplishing this purpose constitute the subject matter of this invention. In one system, the rocket case is fabricated of a deflagrating plastic or other material, such as nitrocellulose, which is protected from the flame until the propellant grain has been substantially completely burned out. A thick section of propellant or slow burning section of fuse can be used to delay ignition of the case for a time sufficient to allow the rocket to complete its trajectory before being consumed. In another system, the case, including the fins, and the nozzle, are fabricated of a water soluble substance such as a water soluble resin, colloid, or carbohydrate as represented by the sodium or potassium salts of polyacrylic acid, polyvinyl alcohol, hydroxyethyl cellulose, carboxymethyl cellulose, gelatin, casein, alginates, sugars, proteins and carbohydrates. In general, these materials may be said to be selected from a group consisting of physiological acceptable substances. Each member of the group, as stated, is of a high order of solubility in aqueous medium such as water or body fluids in which the solubility is purely physical such as by the solvation process without reliance on chemical reaction or transformation. Thus, on entering the body, the case and nozzle would be dissolved by the body fluids for substantially complete disappearance. When falling free on land, the remains of the rocket including the case, fins and nozzle would be dissolved by the rains or moisture. The case and nozzle would not disappear rapidly as would the combustible case embodying the previous concept, but in jungle warfare or in the event that the case is embedded in a human target, it would still be difficult to recover any identifiable remainder.

Thus it is an object of this invention to produce a miniature rocket in which the case and nozzle forming elements of the rocket are caused to disappear upon completion of its trajectory.

This and other objects and advantages of this invention will hereinafter appear and for purposes of illustration, but not of limitation, embodiments of the invention are shown in the accompanying drawing in which—

FIG. 1 is a sectional view of a miniature rocket projectile embodying the features of this invention, and

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FIG. 2 is a sectional view of a miniature rocket projectile showing a modified construction thereof.

With reference now to a description of the drawings, FIG. 1 illustrates a rocket projectile having a combustible case and fins 1 formed of such material as nitrocellulose. The case is formed of a cylindrical member closed at its forward end with a nose piece and open at its rearward end for receipt of a non-deflagrating nozzle 2 and a propellant grain 3 with a central burning port 4 extending lengthwise substantially throughout the entire grain and in communication with the port of the nozzle located at the rearward end of the case. The propellant grain can be separated from the case by a non-combustible liner 5 formed of such material as china clay. In the modification wherein use is made of a liner to separate the combustible grain from the combustible case, use can be made of a plug 6 which may be either propellant or in the form of a slow burning fuse which operates to conduct flame from the grain about the insulator to ignite the case, after suitable delay.

In FIG. 2, illustration is made of the modification wherein the case and fins 7 are formed of a material soluble in aqueous medium as previously described. The rocket includes a soluble nozzle 2 and a propellant grain 3 with a central burning port 4. Upon completion of the trajectory, the propellant grain 3 will be consumed to leave only the water soluble or body fluid soluble case, fins and nozzle. On contact with a body or when exposed to the elements, these rapidly disintegrate or disappear by reason of solution or disintegration by aqueous medium including the body fluids or water in the form of rain or moisture to which the case and nozzle will be exposed while resting on the ground.

During combustion of the propellant grain in flight, the nozzle will remain intact in the modification shown in FIG. 1, when formed of a non-deflagrating material such as metal or, in the preferred practice, the nozzle can be formed of a material which burns away gradually in response to the flame or combustion gases projected rearwardly therethrough in flight thereby to increase the nozzle opening in a proportion to the increase in volume of combustion gases resulting from increase in the area of burning of the grain. As a result, the nozzle will lose its identification when separated from the case upon consumption or disintegration of the latter. Instead, the nozzle can be formed of the combination of a body portion of a consumable material which may be the same as that of which the case is formed but with a non-combustible metal liner about the passage through the nozzle. Thus the case and the major portion of the nozzle will be destroyed after completion of the trajectory of the rocket.

I claim:

1. A disappearing self-propelled miniature rocket projectile comprising the combination of a casing in the form of a cylindrical section of small dimension having a pointed nose piece at the front end and which is open at the rearward end, a propellant grain within the casing and a nozzle in the open rear end of the casing through which the combustion gases issue upon burning of the propellant grain to propel the rocket through space with the burning propellant grain, said casing being formed of a highly combustible material, a thermal insulation lining the interior of the casing for separation of the casing from the propellant grain during combustion in flight and means for igniting the casing from the burning propellant grain upon completion of flight comprising an ignition charge at the end portion of the propellant grain, beyond the lining, for directly communicating the end portion of the propellant grain with the combustible casing.

2. A miniature rocket as claimed in claim 1 in which the liner is formed of clay.

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3. A miniature rocket as claimed in claim 1 in which the casing is formed of nitrocellulose.

4. A disappearing self-propelled miniature rocket projectile comprising the combination of a casing in the form of a cylindrical section of small dimension having a pointed nose piece in the front end and which is open at the rearward end, a propellant grain within the casing and a nozzle in the open rear end of the casing through which the combustion gases issue upon burning of the propellant grain to propel the rocket through space with the burning propellant grain, said nozzle and casing being composed of a material which is rapidly soluble in aqueous medium including water and body fluids.

5. A miniature rocket as claimed in claim 4 in which

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the casing and nozzle are formed of a water soluble resinous material.

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