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RIFLE LAUNCHED ROCKET

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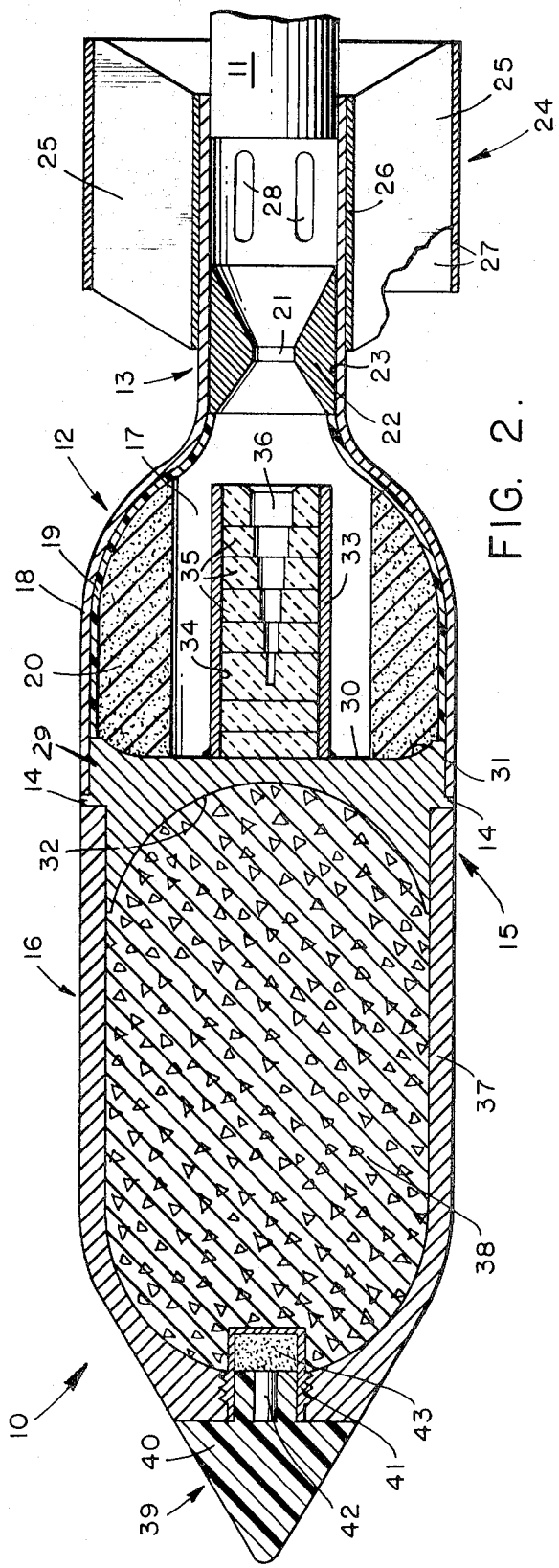

FIG. 2.

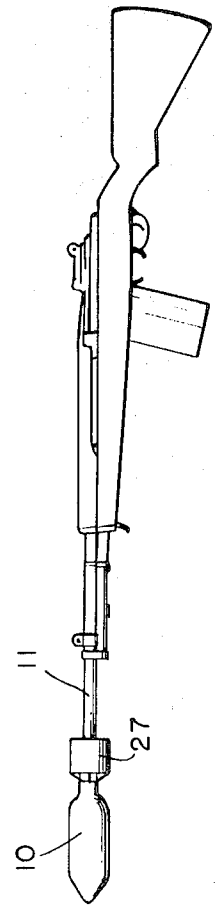

FIG. 1.

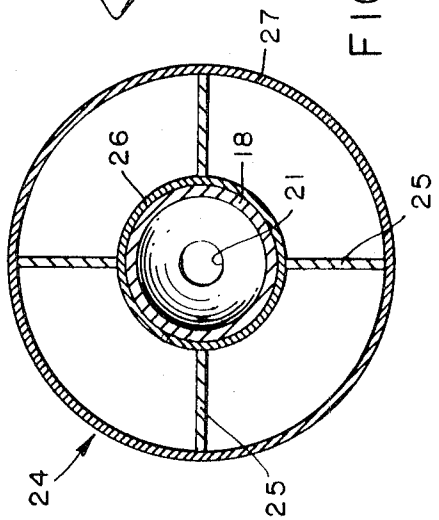

FIG. 3.

INVENTOR.
PAUL C. KING

BY
ROY MILLER
ATTORNEY.

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RIFLE LAUNCHED ROCKET

Paul C. King, China Lake, Calif., assignor to the United States of America as represented by the Secretary of the Navy

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U.S. Cl. 102—65.2 3 Claims

ABSTRACT OF THE DISCLOSURE

A rifle launched rocket which comprises a rocket motor provided with a bullet catcher and a warhead with a fuse assembly and means for attachment of the rocket to the muzzle of a field rifle. In operation when the rifle is fired the combination of the bullet momentum and the gases from the fired cartridge create sufficient impetus to launch the rocket from the barrel of the rifle. Simultaneously the bullet ignites the rocket motor which propels the rocket to the target at high speed. When the forward end of the rocket which carries the warhead and fuse assembly hits a target, the fuse initiates detonation of the warhead. This device provides a means for boosting the range and destruct capability of small rockets carrying high explosives or various types of chemicals.

GOVERNMENT INTEREST

The invention described herein 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.

BACKGROUND OF THE INVENTION

The invention relates to a rifle launched rocket.

In the field of small weapons, particularly, objects designed to be thrown, dropped, projected, or propelled by a hand operated, individually carried apparatus, such as a field rifle, the need exists for greater target capability. Hand and gun tossed grenades and small launchers have been developed and used as a means of defense or offense. However, these missiles generally have limited effectiveness. The present invention will overcome some of the difficulties encountered and provide an effective means of boosting the range and destruct capability for one handling a single weapon.

DESCRIPTION OF THE DRAWING

FIG. 1 is a view of the rocket positioned on a field rifle in accordance with this invention;

FIG. 2 is a longitudinal section of the rocket attached to the muzzle end of a field rifle; and

FIG. 3 is a section of the fin assembly.

DESCRIPTION OF THE INVENTION

Referring now to the drawing wherein similar numbers refer to similar parts there is shown in FIG. 1, rocket **10** embodying this invention positioned on the muzzle end of a field rifle **11**. In FIG. 2 rocket **10** is shown in section. It comprises a rocket motor **12**, the rear end of which encloses a nozzle **13**, a bullet assembly **15** attached by threaded or other means to the forward end of said motor **12** at point **14**; and a warhead **16** secured to the forward end of catcher assembly **15** by suitable means such as sliding over a flange or by threaded means. Rocket motor **12** comprises a combustion chamber **17** formed by a hollow metal casing **18** lined with insulation material **19**, such as phenolic asbestos, and containing therein an internal perforated solid propellant grain **20**. Grain **20** is cast into said chamber **17**, or wrapped with insulation material **19** and secured to the walls of said

chamber. The insulation also functions as an inhibitor against ignition of the grain. Nozzle **13**, an extension of casing **18** which forms the chamber, is a conventional type for exit of the thrust producing high pressure gas produced upon ignition of propellant grain **20**. The gases pass through the nozzle throat **21** which is provided with insert **22** composed of graphite or phenolic asbestos bonded to casing **18** with a cement designated **23**. A fin assembly **24**, attached to the nozzle end of rocket **12** and the muzzle end of rifle **11**, provides for stabilization of rocket **10**. Fin assembly **24** comprises four fins designed generally by numeral **25**, which are attached to an inner ring member **26** adapted to closely engage the outer surface of casing **18** of the end of said rocket nozzle **13** and the outer surface of the muzzle end of the rifle **11**. That part of ring member **26** which engages casing **18** is secured thereto by welding or other suitable means. The outer edges of fins **25** are joined by close fit or are cemented to an outer ring member **27**. Two ports designated **28** are positioned opposite each other in the nozzle section **13** near the point of attachment of inner ring **26**. Ports **28** serve to release the overpressure caused by gases escaping from the cartridge of the rifle. Bullet catcher **15** comprises a metal plate **29**, having a forward surface **30** provided with a flanged edge **31** which fits into the forward end of rocket casing **18** and the rear surface **32** which is concave and closes the cylindrical shaped warhead **16**; a cylindrical metal tube **33** which is mounted on the center of said plate and is positioned through the middle of combustion chamber **17** with the same axis as said nozzle throat **21**. Tube **33** is provided with a liner **34** comprising a plurality of ceramic discs. The discs at the forward end of the tube adjacent plate **29** are solid, and each of the others are provided with a center bore of varying dimensions so that when they are stacked one on the other a single conical shaped bore **36** is formed. Liner **35** acts to stop the bullet as it passes from the gun through the rocket nozzle into bore **36** of said assembly. The warhead **16** comprises a metal cylinder **37** substantially filled with a high explosive **38** and secured by threads or other suitable means to the concave side **32** of said bullet catcher plate **29**. A fuse mechanism **39** is threaded in the nose of said warhead **16** for detonation of the warhead high explosive **38**.

A plastic hood **40** is shown covering the main components of said mechanism. The fuse body **41** is of steel and is secured by threaded means into the nose of warhead **16**. The detonating train **42** is shown positioned through the center of the fuse and in contact with a booster charge **43** which is adjacent high explosive **38**.

Many conventional impact fuses are available which initiate detonation upon impact of a target. An example of a suitable fuse is described in detail in Pat. No. 2,948,219, which issued to W. F. Sapp in August 1960, and is assigned to the United States of America as represented by the Secretary of the Navy. A delay fuse can also be used, such as described in Pat. No. 3,162,127 which issued in December 1964, and is also assigned to the Government. The delay fuse will permit the rocket to penetrate the target before detonating the explosive carried in the warhead.

The liner for the bullet catcher comprises ceramic discs made from boron carbide. Other ceramics which are temperature and pressure resistant can be used.

In operation rocket **10** is attached to the muzzle of the gun **11**. When the gun is fired the bullet passes through the nozzle throat **21** of motor **12** into bore **36** which catches the bullet. The bullet impact and gun gases launch the rocket, and ignite the propellant grain. Burning of the propellant creates sufficient thrust to propel

the rocket to the target. When the rocket hits or approaches the target, the fuse is initiated whereupon detonation of the high explosive carried in the warhead causes destruction.

The term "rocket" used herein means an aggressive missile, carrying a warhead containing a payload of high explosives or other chemicals, that is projected from a launcher (a rifle) toward a target by a rocket power plant or a solid rocket combustion unit. This rocket can be used on various types of rifles without modification of the rifle. It is easily portable and simple to use.

The solid propellant used in the rocket motor is generally of the composite type, although the homogeneous (double-base) propellant can also be used. Examples of the composite propellants are the polysulfide propellants which are a mixture of granular ammonium perchlorate suspended in a polysulfide synthetic rubber; the polyurethane propellants which are prepared by the reaction of di-isocyanate material with polyglycols containing functional hydroxyl groups and subsequent addition of ammonium perchlorate along with aluminum powder to increase performance; and plastisol perchlorate propellants which are made by dispersing an inorganic oxidizer in a fluid fuel mixture made of approximately equal parts of finely divided polyvinyl chloride and a non-soluble plasticizer. There are many other composite grains which can be used. The double-base grain is a gelatinized colloidal mixture consisting of nitrocellulose and an explosive plasticizer usually nitroglycerin.

The casing was steel. Other suitable materials can be used such as aluminum and many of the plastics depending on shelf-life and compatibility of materials.

The warhead was filled with the high explosive, cyclotetramethylenetetranitramine (HMX), or cyclotrimethylenetrinitramine (RDX). Other high explosives such as composition C and diaminotrinitrobenzene (DATB) could be used, as well as some of the anti-personnel agents and gelled fuels in use today.

What is claimed is:

1. A rifle launched rocket consisting essentially of
- a rocket motor provided with a fin assembly and means for attachment at its nozzle end to the muzzle of a rifle;
- a bullet catcher assembly secured to the forward end of said motor; and
- a warhead provided with a fuse and containing a high explosive mounted to the forward end of said bullet catcher assembly;
- said rocket motor consisting of a combustion chamber closed at the forward end by a bullet catcher assembly and having an opening at the aft end through an exhaust nozzle and an internal perforated propellant grain bonded to the combustion chamber wall;
- said bullet catcher consisting of a metal plate; a cylindrical tube closed at one end by said plate; said tube being projected into the center of said combustion chamber adjacent said nozzle and having the same axis as said nozzle; a plurality of ceramic discs stacked inside said tube to form a liner;
- said discs at the base of said tube being solid and the remainder of said discs being provided with a center bore of varying dimensions whereby said stacked discs form a single conical bore which catches the bullet from the rifle as it passes through the nozzle throat whereupon the bullet impact and gun gases act to launch said rocket.

2. The rocket in accordance with claim 1 wherein said warhead comprises
- a metal cylinder substantially filled with a high explosive being a member selected from the group consisting of cyclotetramethylenetetranitramine, and cyclotrimethylenetrinitramine, and
- an impact fuse positioned in the nose of said cylinder whereby said explosive detonates when said fuse strikes a target.

3. The rocket in accordance with claim 2 wherein said fin assembly and means for attachment of said rocket to the muzzle end of a rifle comprises
- a first ring member adapted to closely engage the outer surface of the end of the nozzle of said rocket and the outer surface of the muzzle end of said rifle; said member being welded to said nozzle surface;
- four fins suitably attached to the outer surface of said ring member, and
- a second ring member adapted to engage the outer edges of said fins.

References Cited

UNITED STATES PATENTS

1,900,790	3/1933	Brandt	102—65.2
2,853,008	9/1958	Bowles	102—65.2
2,998,772	9/1961	Land	102—56
3,007,410	11/1961	Blacker	244—3.3
3,140,660	7/1964	Wyser	102—65.2
3,439,615	4/1969	Forman et al.	102—65.2

VERLIN R. PENDEGRASS, Primary Examiner