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BREECH SEAL FOR ROCKET AMMUNITION

Filed Oct. 3, 1966

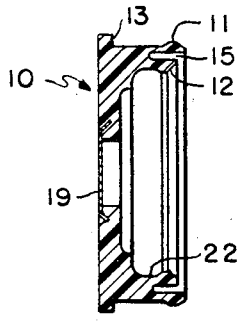

Fig 1

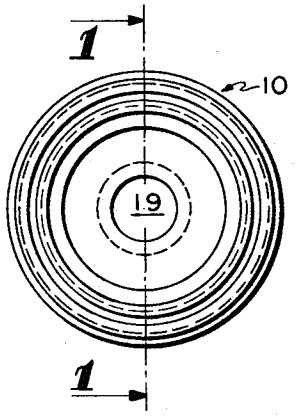

Fig 2

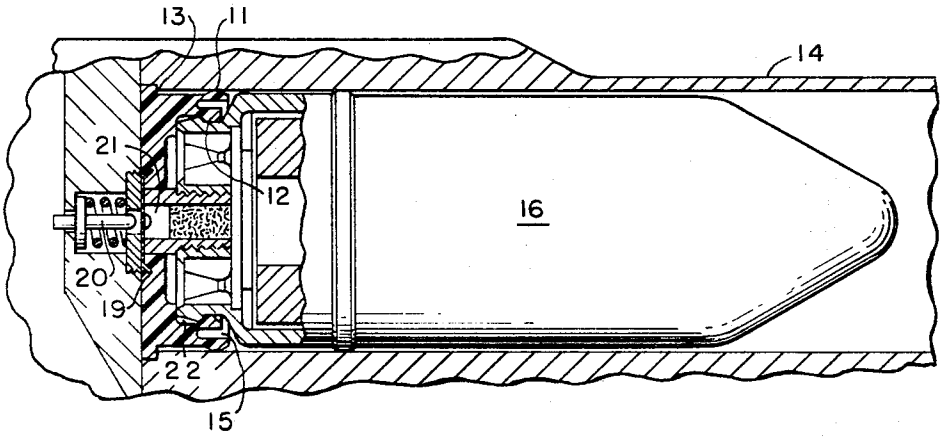

Fig 3

INVENTOR.
WILLIAM J. MERTENS
BY Alden H. Rodgers
Charles M. Hogan
ATTORNEYS.

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BREECH SEAL FOR ROCKET AMMUNITION

William J. Mertens, Richmond, Ind., assignor to Avco Corporation, Richmond, Ind., a corporation of Delaware

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ABSTRACT OF THE DISCLOSURE

This invention is a sealing device which is quickly attachable to or detachable from a rocket. It is a unitary hollow polyethylene cylinder formed with a body portion adapted to be inserted into the firing chamber of a breech loading weapon to provide a seal. This body portion is formed with an annular forwardly extending bifurcation which defines two flanges. The first is a lip-like inner flange which is formed to maintain attachment of the cylinder to a rocket in the presence of handling forces but flexes to become severed from the rocket in response to gas pressures. The second or outer flange is spaced from the inner flange and provides a breech seal.

The present invention relates to ordnance and specifically to the adaptation of pure rocket rounds to standard closed-breech weapons.

The principal object of the invention is to provide a breech seal which makes practical and efficient the firing of rocket rounds by standard closed-breech weapons of the type normally used to fire cartridge-type rounds. In accordance with the present invention there is provided a molded plastic device that seals breech gases in a standard closed-breech weapon. The device provides a means whereby pure rocket ammunition can be handled, chambered, and fired in the same manner as standard cartridge-type ammunition. The invention is applicable to all weapons designed to fire cartridges and will be needed whenever a rocket replaces standard ammunition in a conventional weapon.

Rocket ammunition offers advantages over the standard case-type or semi-case type round wherein a charge is ignited in a cartridge case to propel a projectile to its maximum velocity at the muzzle. Standard case-type rounds or the like are limited in peak muzzle velocity by virtue of the limit which must be placed on the recoil forces associated with and determined by the projectile mass and muzzle velocity and the length of the barrel. Rocket rounds, on the other hand, are capable of reaching velocities outside the barrel far in excess of conventional rounds because the additional velocity achieved by the rocket after it is launched has no effect on recoil.

The standard 40 millimeter round, for example, is composed of a cartridge case containing a charge of propellant and a warhead. The case and warhead elements are crimped together and are loaded as a single unit. Upon firing, the resultant internal pressure causes the cartridge case to expand against the walls of the barrel to seal the gases, thereby improving efficiency and, at the same time, protecting the gunner from breech blast. As is true with all cartridge-type rounds, a relatively high breech pressure is generated when the propelling charge is ignited. In the M/79 weapons, pressures of 3,000 lbs. per square inch have been measured in the breech with the inner chamber of the cartridge reaching pressures as high as 35,000 lbs. per square inch. Adequate force is available to expand the cartridge case and create a very effective seal.

By contrast, rockets are characterized by relatively low

pressures. The assignee of the present application and invention has developed rocket ammunition and a weapon for same, as described in United States patent to McGowan, No. 3,204,530, issued Sept. 7, 1965, in which the peak pressure for 40 millimeter ammunition is 4,000 lbs. per square inch, with breech pressures never rising above 500 lbs. per square inch. Now in the McGowan weapon the bolt seals the breech because of the fact that it projects into the chamber. Additionally, the bolt may be provided with piston rings which are installed in grooves near the front end of the bolt. However, in standard available weapons, not special weapons of the McGowan type, the problem solved by the present invention was to provide a seal for the breech in a manner not requiring modification of the weapon. In other words, the invention adapts rocket-type ammunition to standard weapons which are not provided with the special built-in sealing features of the patented McGowan gun.

For example, one of the first problems that had to be solved before a pure rocket round could be fired from the M/79-40 millimeter-type weapon was to seal the breech in a manner that would not require modification of the weapon. At the same time, it was desired to package the rocket round in such manner that it could be handled, loaded, and fired as a standard round. The polyethylene breech seal described herein solved this problem. Further, it provides a means whereby any pure rocket round that uses a standard primer for ignition can be fired from existing weapons without modification. The polyethylene seal can be used on rocket ammunition designed for weapons ranging from 30 caliber carbines to howitzers.

For a better understanding of the invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following description of the accompanying drawings in which:

FIG. 1 is a cross-sectional view of a breech seal in accordance with the invention, as taken along section line 1—1 of FIG. 2;

FIG. 2 is a top plan view of the seal;

FIG. 3 is a cross-sectional view of the seal as secured to a rocket, the unit comprising the rocket and seal being shown as installed in a standard weapon, which weapon is designed for cartridge or case-type ammunition.

The breech seal **10** has three working surfaces: an outer flange **11**, an inner flange **12**, and a rim **13**. The flanges are formed as spaced annular lips, the outer flange bulging radially outwardly and the inner flange bulging radially inwardly. The outer flange **11** has a diameter that is slightly larger than the breech inner diameter. When the round is inserted in the barrel **14** of a conventional weapon, the outer flange **11** is compressed to provide a partial seal. It is free to move during chambering by virtue of an annular undercut **15** which spaces the outer and inner flanges. Pressure generated in the breech by the rocket motor expands the outer flange **11**, thus forming a positive seal.

The inner flange **12** has a diameter that is smaller than the outer diameter of the rear end of the rocket motor **16**. Both flanges are formed with an annular lip-like configuration and the inner flange is provided with a chamfer at **22** in such manner that it is easily snapped onto the rocket motor but requires a large force for removal. However, when gases generate pressure inside the seal, the inner flange **12** is expanded and immediately releases the rocket motor. This provides rugged handling and chambering characteristics. It is also a feature which will permit the rocket round to be belt- or magazine-fed in an automatic weapon presently designed for a standard cartridge case. Finally, the inner flange **12** provides a weather seal for the rocket motor nozzle end.

The rim **13** has precisely the same function as the rim on a standard cartridge case. It stops the round on chambering and provides guidance during automatic feed. After firing, in the case of the M/79, an extractor partially ejects the seal from the barrel.

The breech seal is generally cylindrical or cup-shaped in form and a .005 inch thick aluminum disk **19** is molded into a countersunk aperture in the center of its flat body portion. The disc merely seals gases forward of the firing pin **20**. The disc **19** is made of soft aluminum such that the firing pin **20** strikes through the aluminum transmitting its force to a primer cup **21**.

The breech seal is suitable for economical molding processes. The aluminum disc could be replaced by a thin film of plastic which would be established in the same step that the rest of the seal is formed.

The advantages of a breech seal in accordance with the invention are therefore as follows: first, it enables a rocket round to be employed with a standard weapon, providing a seal before gases are generated in the chamber; second, it is so arranged as to constitute substantially an integral part of or a firm attachment to a rocket motor for purposes of handling and chambering, but is readily severable therefrom in response to the generation of a low internal pressure; third, it incorporates a rim which allows a rocket motor to be handled in a weapon in the same manner as a standard cartridge case; fourth, it incorporates a thin membrane between the firing pin and primer.

While there has been shown and described what is at present considered to be the preferred embodiment of the invention, it will be understood by those skilled in art that various modifications and changes will be made therein without departing from the proper scope of the invention as defined in the appended claims.

Having fully described my invention, I claim:

1. In ordnance a sealing device which is adapted to be attached to a rocket and to be handled and transported therewith, but which is readily severable therefrom in response to firing of a weapon comprising:

a unitary, hollow cylinder formed with a circular body portion adapted to be placed within the firing chamber of a cartridge-case type breech-loading weapon to provide a breech seal, said body portion being formed with an annular, forwardly extending bifurcation defining a lip-like first flange and a second and outer flange spaced from the first flange, said flange being formed securely to maintain attachment of the cylinder to a rocket against handling forces but to flex to become severed from the rocket in response to gas pressures generated on firing, said outer flange providing a breech seal.

2. The combination in accordance with claim **1** in which the body portion is further formed with a base rim to simulate the rim of a cartridge case.

3. The combination in accordance with claim **2** in which the body portion is formed with a central aperture, and a membrane disposed within said aperture for permitting the translation of percussive forces.

4. The combination in accordance with claim **3** in which the cylinder is made of polyethylene.

5. The combination in accordance with claim **4** in which said membrane is made of aluminum.

6. In ordnance a sealing device which is adapted to be attached to a rocket and to be handled and transported therewith, but which is readily severable therefrom in response to firing of a weapon comprising:

a unitary, hollow cylinder formed with a circular body portion adapted to be placed within the firing chamber of a cartridge-case type breech-loading weapon to provide a breech seal, said body portion having an axis and being formed with an annular, forwardly extending lip-like flange and with a central aperture concentric with said axis,

the flange being formed securely to maintain attachment of the cylinder to a rocket against handling forces but to flex to become severed from the rocket in response to gas pressures generated on firing,

and a membrane disposed within said aperture for permitting the translation of percussive forces.

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ROBERT F. STAHL, *Primary Examiner.*