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WARHEAD

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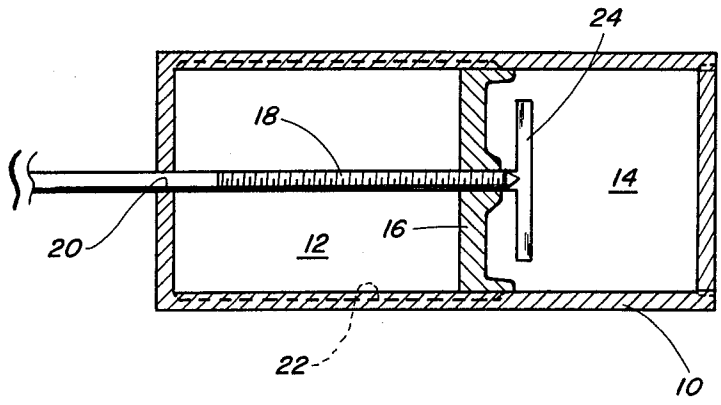


FIG. 1

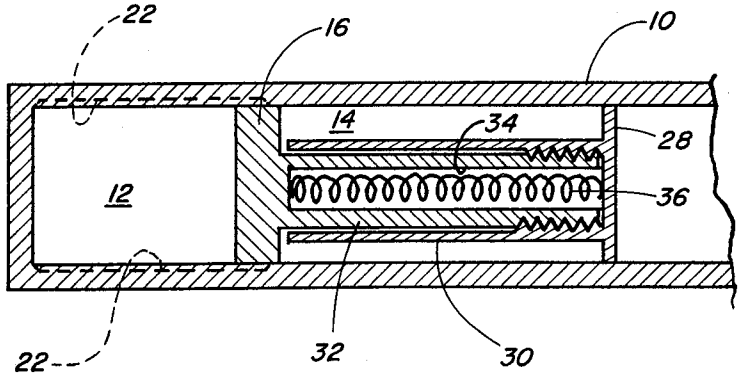


FIG. 2

INVENTORS
William E. McQuistion
Giorgio Tesi

BY J. O. Tresansky
ATTORNEY

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WARHEAD

William E. McQuistion, Port Tobacco, and Giorgio Tesi, Accokeek, Md., assignors to the United States of America as represented by the Secretary of the Navy

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ABSTRACT OF THE DISCLOSURE

A warhead in which the explosive ingredients are stored separately in partitioned spaces to render each ingredient by itself inert to shock. The explosion is effected by removing the partition in response to the propulsion forces imparted upon the weapon and mixing the ingredients and igniting the mixture.

BACKGROUND OF THE INVENTION

This invention generally relates to explosive warheads and more particularly to a warhead which is loaded with either liquid or solid high explosives readily detonatable by suitable initiation.

In the past, warheads for ordnance weapons, such as torpedoes and projectiles, have been loaded by filling the warhead with either liquid or solid high explosives which are ready to detonate upon suitable initiation. Although these explosives are usually selected to reduce their sensitivity to shock, impact or other initiating impulses, the explosive nature of their composition makes them potentially hazardous to accidental initiation. In many cases, such uncontrolled initiation has resulted in catastrophic explosions wherein serious injury and extensive property damage is involved. With the methods heretofore employed, the energy of the explosive has been limited by the tendency of the explosives to become more sensitive to initiation as the energy is increased, thus increasing also the hazards in handling of such highly energetic explosives. Thus, the storage of such high energy explosives-containing warheads in confined areas such as, for example, aboard ships and in submarines, is a cause of great apprehension to the personnel thereon.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a warhead for an ordnance device wherein the ingredients of the explosive composition are normally maintained insensitive until the ordnance vehicle is placed into operation.

Another object of the present invention is to provide a warhead having explosive ingredients therein which are insensitive to inadvertent environmental initiating forces and possess storage capability under extreme environmental conditions.

Yet another object of the present invention is to provide a warhead which is economical in construction and may be safely stockpiled and handled without fear of detonation.

A still further object of the present invention is to provide a warhead having increased lethality without coincidentally increasing the hazards involved in the handling of the warhead.

The foregoing and other objects are attained by separating two insensitive ingredients of an explosive composition in separate storage areas within a warhead with a device which will enable complete mixing of the ingredients after launching of the weapon. The nature of the separation and the mixing varies depending upon the nature of the warhead and the nature of the ingredients employed. Briefly, in accordance with one embodiment of

the present invention, a piston separating two chambers of a cylinder, one of which is grooved longitudinally along the cylinder wall, is movable or advanceable by the propulsion forces imparted upon the weapon for permitting the fluid or other explosive ingredients to mix through the grooved wall.

BRIEF DESCRIPTION OF THE DRAWINGS

Still other objects and many of the attendant advantages and features of this invention will be readily appreciated as the same becomes better understood by reference to the detailed description when considered in connection with the accompanying drawings in which like reference numerals designate like or corresponding parts throughout the several figures and wherein:

FIG. 1 is a longitudinal sectional view of a torpedo warhead formed according to the teachings of the present invention and showing a chamber-separating piston which may be advanced or moved between the chambers by a screw set in motion by the propulsion of the torpedo in the water; and

FIG. 2 is a longitudinal sectional view of another embodiment of the present invention adapted for use in an artillery shell wherein movement of the chamber-separating piston is accomplished by the longitudinal and centrifugal forces imparted to the shell upon the firing thereof from a gun barrel.

DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Referring now to the drawings and more particularly to FIG. 1 thereof, there is shown a cylindrical container **10** having formed therein a pair of chambers **12** and **14** separated by a partition or piston member **16** sealably engaging the interior wall of the cylinder and movably disposed along the axis thereof. An elongate rod **18** is axially disposed within the cylinder **10**, being primarily positioned within the chamber **12**, and having one end thereof extending through an aperture **20** formed in the end wall of the chamber **12** which is suitably connected to rotational driving means, such for example as the propeller of a torpedo for being rotatably driven thereby while the torpedo is being propelled within the water. The other end of the rod **18** is threaded and extends axially through the partitioning member **16** in threaded engagement therewith for causing the partitioning member **16** to be moved within the cylinder **10** along the rod **18** in the direction of the chamber **12**.

Longitudinally disposed within the cylinder **10** along the interior wall thereof on the chamber **12** side of the cylinder are a plurality of elongate grooves **22** which normally communicate with only the chamber **12** and are separated from the chamber **14** by the partitioning member **16**. Upon movement of the partitioning member **16** these grooves are effective for bypassing the partitioning member and allowing the contents of the chamber **12** to be transferred to the chamber **14**. By placing two insensitive fluid-like ingredients of an explosive composition in the chambers **12** and **14**, respectively, and separating the same with the partitioning member **16**, complete safety is provided against accidental detonation during handling and storage of the weapon. The combination of the ingredients in the chambers **12** and **14** to form the high explosive mixture in the warhead is accomplished upon release of the weapon from its launching device, the partitioning member **16** being caused to move along the propeller-driven, threaded rod **18**, whereby the ingredient in chamber **12** is forced through the grooves **22** into the chamber **14**. Thus, the explosive is available for its purpose upon reaching the target. Thorough mixing of the ingredients may be enhanced by a mixer or stirrer **24** disposed upon the end of the rod **18** within the chamber **14** for being

rotated therewith while the transfer of ingredients takes place.

Referring now to FIG. 2, there is shown another embodiment of this invention adapted to be used within an artillery shell, or the like, in which the release and mixing of the insensitive explosive ingredients can be accomplished by the longitudinal and centrifugal forces imparted to the shell upon firing thereof from a gun barrel, or the like. Separation of the insensitive ingredients in this case is maintained in much the same manner as in the torpedo warhead, a piston member **16** being employed between two chambers **12** and **14** within a cylindrical member **10** for preventing the mixing of the ingredients disposed within the chambers **12** and **14**. Also, as in the previous embodiment, a plurality of longitudinal grooves **22** formed in the wall of the cylindrical member **10** along that portion only which bounds the chamber **12** provides for fluid communication between the chambers **12** and **14** upon movement of the piston member **16** in the direction of the chamber **12**.

A supporting wall **28** is securably affixed within the cylindrical member **10** for confining the ingredient in chamber **14** therewithin. An elongate sleeve **30** is attached at one end to the support **28** and extends axially into the chamber **14**. The sleeve **30** is interiorly threaded at the end thereof connected to the support **28** for receiving in threaded engagement the threaded end of a stem portion **32** integrally formed on one face of the piston member **16**. The piston stem **32** has an axial bore **34** therein in which there is disposed a compression spring member **36**, which abuts at the open end of the piston stem **32** with the face of the supporting wall **28** defining one end of the chamber **14**.

Accordingly, it may be seen that when properly installed within an artillery shell or other spinning projectile, being oriented along the longitudinal spin axis thereof, this device will be operative in response to the longitudinal setback and centrifugal spinning forces imparted thereon for disengaging the piston stem **32** from the guiding sleeve **30** through relative rotation therebetween, whereupon the piston **16** is urged in the direction of chamber **12** by the compression spring **36**, thereby to force the insensitive fluid ingredient from the chamber **12** through the grooves **22** and into the chamber **14**. Increased mixing efficiency of the two ingredients may be accomplished, if desired, by baffle members disposed on the interior wall of the cylindrical chamber **10**.

Examples of ingredients which can be employed in this invention as oxidizers are hydroxylammonium perchlorate, ammonium nitrate, ammonium perchlorate, perchloric acid and nitric acid, among others, and as fuels in the other chamber organic materials such as alcohols, hydrocarbons, ethers or metals such aluminum, zirconium, boron and lithium, to name a few. These materials may be used alone or in combination, either as liquids, suspensions, solutions or solids.

Obviously, the embodiments described herein are readily variable structurally for adapting the same for use with mines, bombs and other air-launched weapons. The principal advantage afforded is that the present invention provides a safe explosive weapon with long storage life by maintaining separation of two intrinsically insensitive and stable ingredients of explosive composition until the weapon is launched.

Many other modifications and variations of the present invention are obviously possible in light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. In a warhead for a weapon comprising:
- a cylindrical container closed at both ends;
- a movable piston seal disposed within said container for dividing it into two chambers to separately contain the insensitive ingredients of an explosive composition;
- longitudinal groove means in the wall of said cylinder for providing a normally closed passageway between said two chambers and openable upon axial movement of said piston;
- means responsive to the propulsion of said warhead for moving said piston axially including;
  - means releasably maintaining said piston centrally in said container;
  - means responsive to the axial and centrifugal forces developed by said warhead for releasing said said piston; and
  - means urging said piston to move axially to open said groove means.

2. A device as set forth in claim **1** wherein said urging means comprises a compression spring.

3. A device as set forth in claim **2** wherein said means releasably maintaining said piston centrally in said cylinder comprises:
- an elongated leg depending from said piston;
- an elongated sleeve member extending from said one end of said container in the direction of said piston member for receiving therein in threaded engagement said piston leg;
- said piston leg having an elongated bore therein, whereby said spring is disposed within said bore between said piston and said one end of said cylinder.

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VERLIN R. PENDERGRASS, Primary Examiner