Aug. 4, 1964 G. C. BOWEN 3,143,070

SAFE BIOLOGICAL OR CHEMICAL WARFARE PROJECTILE

Filed July 27, 1962

FIG.1.

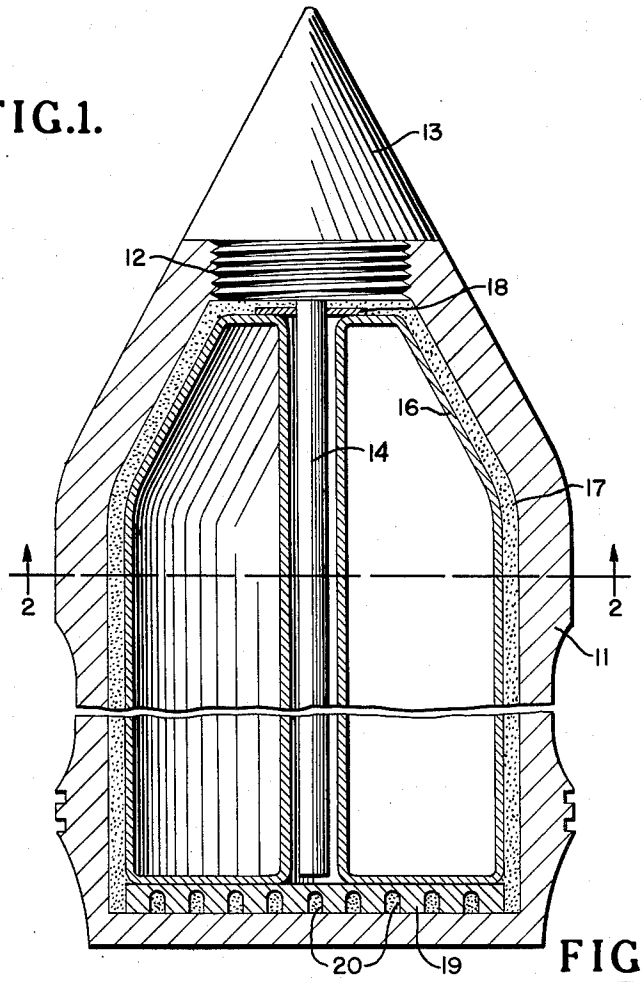


FIG.2

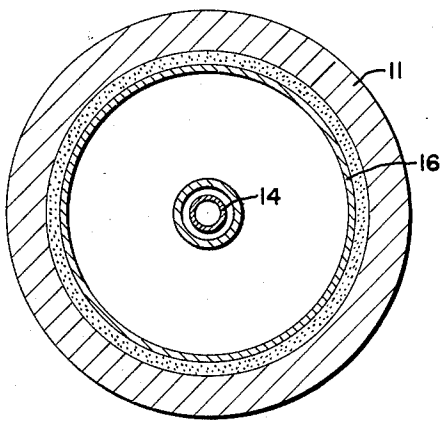
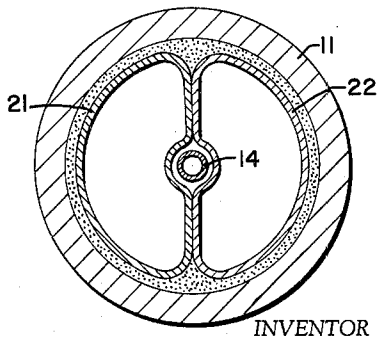


FIG.3.



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SAFE BIOLOGICAL OR CHEMICAL WARFARE PROJECTILE

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10 Claims. (Cl. 102—66)
(Granted under Title 35, U.S. Code (1952), sec. 266)

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.

This invention generally relates to explosive devices such as bombs, projectiles, hand grenades, rocket and missile warheads, or the like, which contain noxious agents commonly utilized in biological and chemical (BW/CW) warfare which may disable, irritate or have a lethal effect upon humans exposed thereto and more particularly relates to a construction of such devices which greatly enhances their safety during transportation, handling and stowage without appreciably affecting the effectiveness of such devices upon detonation.

In the past it has been the general practice to employ an outer container within which is disposed a bursting charge, the BW/CW agent being contained either within the outer container and about the centrally disposed burst charge or in a separate container disposed within the outer container, an example of each type of construction being illustrated in Patent No. 1,878,491 to B. C. Goss. Other examples of the prior art devices are shown in Patents No. 1,961,364 to R. A. Hunter and 2,084,994 to R. C. Allen both of which illustrate hand grenades utilizing a plurality of agent carrying capsules disposed within an outer container, a means for rupturing the capsules and dispensing the agent through openings located in the outer container of the grenade.

While these devices and other devices of the prior art have generally served their purpose, they have not proved entirely satisfactory under all conditions of use in that such devices do not meet the safety standards required, particularly in shipboard use.

When projectiles, bombs, grenades, rockets and missiles, or the like containing noxious agents are stored aboard ship, because of the close quarters and confinement of the shipboard personnel within a relatively small area and within close proximity to these devices, elaborate precautions must be taken to prevent injury to personnel due to the inadvertent escape of one or more of these agents through rupture or leakage of the inner or outer container. It is contemplated that such precautions may result in the individual packaging of such weapons in airtight stowage containers having some type of leak indicator thereon such that should any individual container become faulty the gases are contained within the airtight container and the entire unit is jettisoned. It is obvious, that individual packaging of the devices greatly decreases the number of units which may be stowed in a given space, a critical consideration aboard naval ships. Further, such containers, while greatly enhancing the safety of such devices during storage, do not provide any safety factor to personnel during the period when the device must be removed from the container for loading into a gun or an aircraft, as the case may be, should the projectile or bomb be dropped causing the inadvertent rupture of either the inner and/or the outer container.

It is, therefore, an object of this invention to provide an explosive projectile or bomb having a greatly increased safety factor during transportation, stowage, and handling of the device without any resultant decrease in effectiveness of the device upon explosion thereof.

A further object of the invention is the provision of a BW/CW bomb or projectile which is less hazardous to handling personnel should the agent containing carrier become ruptured.

Another object of the invention is the provision of a BW/CW bomb, projectile, rocket or missile warhead, or the like which contains one or more irritating, disabling, or lethal agents, which is relatively safe during transportation, stowage, and handling but which retains the effectiveness of the devices heretofore known upon explosion thereof.

Yet another object of the present invention is to provide a projectile, bomb, rocket or missile warhead, or the like containing a noxious substance which, upon inadvertent rupture of the container, is neutralized but which, if not prematurely ruptured, retains its effectiveness upon explosion of the device.

Other objects and many attendant advantages of this invention will be more readily appreciated by those skilled in the art upon a reading of the following detailed specification in connection with the accompanying drawings while the scope of the invention will be more particularly pointed out in the appended claims.

To accomplish the foregoing objects, the invention generally contemplates a bomb, projectile, hand grenade, rocket or missile warhead, or the like having an outer casing, a suitable fuze, and a centrally disposed bursting charge. The BW/CW agent is contained within one or more thin-walled containers disposed about the bursting charge and contained within the outer container and separated from the outer container by a neutralizing agent which surrounds the thin-walled inner container. Should the inner container become inadvertently ruptured such that the agent therein is allowed to slowly leak therefrom, the neutralizing agent disposed about the container neutralizes the agent before it can escape from the outer container. However, when the device is exploded by detonation of the centrally disposed bursting charge, the outer and inner containers are fragmented and the neutralizing agent is spread over such a large area that it becomes ineffective and therefore does not appreciably reduce the effectiveness of the device upon detonation.

A single exemplary embodiment of the present invention is illustrated in the accompanying drawings wherein:

FIG. 1 illustrates, partly in section, a bomb or projectile embodying the instant invention;

FIG. 2 illustrates a cross-section of the embodiment of FIG. 1 taken along line 2—2; and

FIG. 3 illustrates a modification of the projectile, in cross-section, illustrating a plurality of containers within the device.

Referring now to FIG. 1 there is illustrated a bomb or projectile having an outer container, wall or casing **11** having an aperture **12** within which is threadably secured a suitable fuze device **13** having connected thereto and centrally disposed within the outer container the bursting charge **14** capable of fragmenting the device upon initiation thereof by the fuze. The fuze **13** may be of the proximity, time or contact type depending upon the desired time of bursting of the projectile or bomb, all of which are well-known in the art and the details of which form no part of this invention.

Disposed within the outer container **11** and about the burst charge **14** is a thin-walled inner container **16** which is filled with any desirable disabling, irritating or lethal gases or gas mixtures, liquids or gas generating chemicals, or biological agents, which, if desired, may be gas or liquid suepended and/or dispensed, all being of a noxious nature. Container **16** is filled through any suitable opening, not shown, and sealed in the manner well-known in the art. Disposed about the container **16** and within the outer container **11** is a neutralizing agent **17** which

completely surrounds the inner container and fills the spacing between the inner container and the outer wall **11** of the projectile or bomb.

The neutralizing agent **17** may take the form of a liquid, powder, paste like substance, or a liquid contained in a plastics foam or sponge. If the neutralizing agent utilized is a powder or paste like substance which is not readily flowable, it may be prevented from entering the central portion of the bomb or projectile by a thin disc **18** secured to the inner container **16** and having an aperture therein to receive the burster **14** thus reducing the ratio of the neutralizing agent to the BW/CW agent thereby reducing the neutralization effect upon explosion of the device without appreciably affecting the safety thereof. On the other hand, if the neutralizing agent is a liquid, the disc **18** may be omitted, or the centrally disposed aperture within the inner container may be sealed at both ends thereof to prevent entry of the neutralizing agent into the space about the burst charge.

Positioned within the projectile or bomb casing **11** opposite the fuze **13** is a spacer **19** utilized to transmit the forces acting on the thin-walled container due to the acceleration of the projectile upon firing to the outer casing **11** and which further acts to position the inner container within the projectile or bomb.

The spacer **19** may have a plurality of interconnecting channels **20** which allows the decontaminate to surround the lower end of the inner container contiguous thereto. Before assembly of the device, neutralizing agent is placed within the lower end of the projectile, the spacer is embedded therein and, after the inner container has been placed therein, the remainder of the space between the inner and outer containers is completely filled with neutralizing agent. As is obvious, if the neutralizing agent is a liquid, the spacer and the inner container may be placed within the outer container before introduction of the neutralizing agent.

In the event that the BW/CW agent escapes from the inner container due to a faulty seam in the inner container, a faulty seal at the filling port, or through fracturing of the inner container should the shell or bomb be inadvertently dropped, the noxious agent therefrom comes in contact with the neutralizing agent **17** and is neutralized thereby therefore preventing harmful escape of the agent and injury to personnel. Upon detonation of the burst charge **14** in the target area the entire outer casing **11** is fragmented and the neturalizing agent is spread over such a wide area due to the spin or aerodynamic forces acting thereon that the neutralization effect thereof becomes negligible.

Referring now to FIG. 3 there is illustrated a modification of the inner container wherein the BW/CW agent or agents is contained within two separate inner containers **21** and **22** each formed as a semi-circle and in contiguous contact with each other such that they form a solid wall about the burst charge **14**. The area between the outer walls of containers **21** and **22** and the inner wall of the outer container **11** is again filled with neutralizing agent and their contiguous contact prevents the neutralizing agent from filling the space surrounding the burst charge **14**. It is obvious that the containers may be filled with either like agents or different agents depending upon the desirability of the contents and it is further obvious that more than two separate inner containers of any configuration may be utilized in like manner.

Numerous modifications of the invention are obviously possible to those skilled in the art in light of the above teachings. For example, by proper construction of the outer container the neutralizing agent may be blown or thrown off before the inner container is fragmented by the burst charge. To accomplish this, an explosive charge may be formed within or thread through the outer container and detonated slightly before detonation of the main burst charge, such that the outer container is fragmented before bursting of the inner container thus allowing the neutralizing agent to blow off before initiation of the burst charge. A like effect may be accomplished by the use of a plurality of explosive bolts threadably secured about the outer container and detonated lsightly before the burst charge. Further, the neutralizing agent may be blown from the projectile or bomb through one or more small holes in the outer container of the projectile that are initially sealed, the seals being broken either by small detonators to shear a disc disposed therein or which may be broken by the propellent gases in the case of a gun fired projectile thus allowing the neutralizing agent to be blown off as the device travels in its trajectory toward the target. Further, the neutralizing agent may be blown from within the container by compressed gases contained within the projectile itself. Likewise, the particular configuration of the inner container or containers may be modified depending upon desired use, contents, or ease in manufacture and the device may contain, for example, a plurality of spheres as the inner containers, around which is disposed the neutralizing agent.

There has been illustrated and described a projectile having inner and outer containers and a neutralizing agent interposed therebtween such that, should the inner container become inadvertently ruptured, BW/CW agents contained therein are neutralized by the neutralizing agent before they can escape through the outer container. Upon detonation of the bomb or projectile the agent within the inner container is released and the neutralizing agent is spread over such a wide area that the neutralization effect thereof becomes negligible.

The neutralizing agent utilized may be, for example, caustic soda or lye but the particular decontaminate or agent forms no part of this invention and will be determined by the particular BW/CW agent or agents contained within the inner container, the most optimum neutralizing agent for a particular agent will be apparent to those skilled in the art.

While the foregoing invention has been described particularly in connection with a projectile or bomb it is apparent that the invention may be utilized with other explosive and non-explosive devices such as hand grenades, rifle grenades, rocket and missile warheads and that the basic structure of the device may be modified within the scope of those skilled in the art without departing from the scope and the spirit of the invention as more particularly pointed out in the appended claims.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. In a device having an outer container and an inner container, the inner container having a noxious agent therein, the improvement comprising:
   a chemically neutralizing means disposed between the inner and outer containers and surrounding the inner container whereby when the inner container is ruptured without complete fragmentation of the outer container the agent contained within the inner container is permanently neutralized by said neutralizing means.

2. In a device having an outer container, an inner container disposed within said outer container and containing a noxious agent therein and an active means for dispensing the agent, the improvement comprising;
   a chemically neutralizing means disposed between the outer and inner containers, said neutralizing means permanently neutralizing the agent upon rupture of the inner container but being substantially ineffective to neutralize the agent when the agent is dispensed by the active means.

3. In an explosive device having an inner container and an outer container, the inner container having the noxious agent therein, the device further having an explosive means for dispensing the agent contained within the inner container, the improvement comprising;
   a neutralizer disposed between the inner container and the outer container for neutralizing the agent with-

in the inner container, said neutralizer being substantially ineffective upon explosion of the explosive means.

4. A device for dispensing a noxious agent comprising;
an outer casing,
an inner casing disposed within said outer casing for containing a noxious agent,
a chemically neutralizing agent disposed between said inner and said outer containers and surrounding said inner container,
whereby when said inner container is ruptured without complete fragmentation of said outer container the agent contained within said container is permanently neutralized by said neutralizing agent.

5. An explosive device for dispensing a noxious agent comprising;
an outer shell,
an inner container having a noxious agent therein,
a neutralizing means disposed between said outer shell and said inner container for neutralizing the agent upon fracture of said inner container without fragmentation of said outer shell, and
means for exploding said outer shell thereby rendering said neutralizing means substantially ineffective.

6. An explosive device for dispensing a noxious agent comprising;
an outer shell,
an inner container having a noxious agent therein,
a neutralizing means disposed between said outer shell and said inner container for neutralizing the noxious agent contained in said inner container.
means for exploding said inner container and said outer shell
whereby upon fracture of said inner container without fragmentation of said outer shell said neutralizing means neutralizes said noxious agent, said neutralizing means being substantially ineffective upon operation of said means for exploding said inner container and said outer shell.

7. An explosive device for dispensing a noxious agent comprising;
an outer container,
an inner container having a noxious agent therein,
a neutralizing agent disposed between said outer container and said inner container for neutralizing said noxious agent upon leakage from said inner container,
a centrally disposed burst charge for exploding said inner and said outer containers thereby releasing said noxious agent and rendering said neutralizing agent substantially ineffective.

8. A device for dispensing a noxious agent comprising;
an outer container,
a plurality of inner containers disposed within said outer container,
a noxious agent within each of said inner containers,
a chemical neutralizer disposed between said inner and said outer containers for rendering permanently ineffective the noxious agent upon leakage from said inner containers.

9. A device for dispensing a noxious agent comprising;
an outer container,
a plurality of inner containers disposed within said outer container,
a noxious agent within each of said inner containers,
a chemical neutralizer disposed between said inner and said outer containers for rendering permanently ineffective said noxious agent upon leakage from any of said inner containers,
means for dispensing said noxious agent in a manner so as to render said neutralizing agent ineffective.

10. A device for dispensing a noxious agent comprising;
an outer container,
a plurality of inner containers disposed within said outer container,
a noxious agent within each of said inner containers,
a neutralizing means disposed between said inner and said outer containers for rendering ineffective the noxious agent upon leakage from said inner containers,
means for exploding said inner and outer containers, said neutralizing means being substantially ineffective upon explosion of said explosive means.

References Cited in the file of this patent

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