DEVICE FOR PRODUCING WHITESMOKE BY IMPLODING RED PHOSPHORUS

ABSTRACT: A device for producing white smoke having an inner core of red phosphorus surrounded by a flexible sheet of explosive material and having means for detonating said explosive material whereby red phosphorus is imploded to produce white smoke.
STATEMENT OF 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 present invention relates to a device for producing white smoke by implooding red phosphorus. Chemicals in the category of screening smokes are those which, when dispersed in air, produce a cloud of finely divided particles of solid, liquid, or both. These are used to shield tactical operations or disrupt the movements of the enemy. Outstanding examples of such materials are: fuel oil used in “artificial fog” generators, white phosphorus, sulfur trioxide, titanium tetrachloride, and so-called zinc chloride smokes. Each of the above-listed smoke-generating compositions is characterized by certain advantages and disadvantages in military operations, depending upon the importance of such factors as mobility of the smoke-producing apparatus, toxicity, logistical considerations, and the total obscuring power of the composition employed.

Traditionally, the Military has used white phosphorus as the load in munitions designed to provide a white smoke mark. The method employed is to explode the white phosphorus by means of a high-explosive center core. The white-pilfering cloud produced is the product of combustion of the white phosphorus with the oxygen from the surrounding atmosphere. White phosphorus is spontaneously reactive with air (pyrophoric) upon dispersal into the atmosphere, the conversion of the white phosphorus to smoke approaches 100 percent.

There are, however, several notable disadvantages to the use of white phosphorus in military hardware, such as increased cost to load due to the pyrophoric nature of white phosphorus, low melting point (44.3° C.), which may cause center of gravity shifts if the load melts, and danger of leakage from containers and shells. Also, presently there is only one production facility in the United States which can load white phosphorus. It has been observed in the past that red phosphorus will produce a white smoke cloud comparable to that produced by the white phosphorus if combustion is complete. In addition, as the red phosphorus is a solid up to 597° C., and is not pyrophoric, it does not have many of the disadvantages of the white form. Additionally, about every commercial pyrotechnic company has the facilities and capability to load red phosphorus, thus insuring competitive bidding and competition.

The main reason that red phosphorus was never universally substituted for white phosphorus in smoke marking munitions was that it was extremely difficult to achieve complete combustion of the red phosphorus with existing technology. It was conventionally necessary to explode the phosphorus into the atmosphere to generate the smoke cloud. This action would result in an excellent white smoke cloud. Red phosphorus was used. On the other hand, however, when the red form was used, not all of the phosphorus was ignited during the explosion. This resulted in incomplete combustion and consequently, a white smoke cloud of reduced size and density was formed.

SUMMARY OF THE INVENTION

The present invention relates to a device for producing white smoke by using red phosphorus. Red phosphorus pellets are wrapped with a flexible plastic explosive and loaded into a thin-walled container or shell. Upon detonation of the flexible plastic explosive, nearly complete combustion is achieved by implosion of red phosphorus thereby producing a smoke cloud similar to that formed from explosion of an equal amount of white phosphorus.