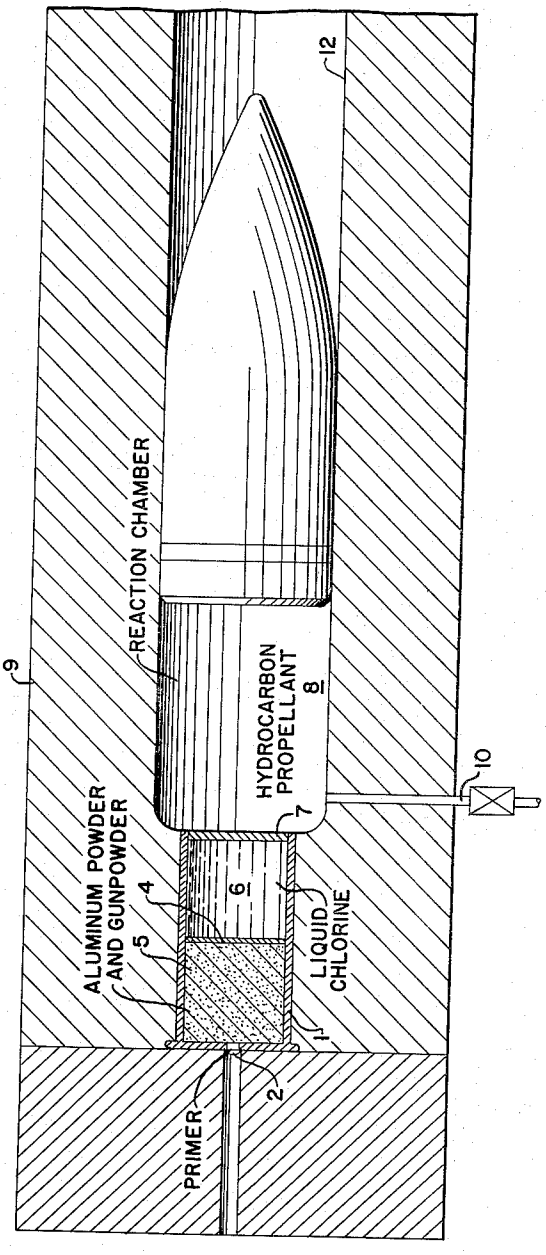
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ALUMINUM-CHLORINE DETONATOR CATALYST FOR HYDROCARBON PROPELLANT

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ALUMINUM-CHLORINE DETONATOR CATALYST FOR HYDROCARBON PROPELLANT

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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 relates to an improved primer charge for the decomposition of hydrocarbon propellants while simultaneously providing a catalyst for the resultant decomposition reaction and the method of detonating same.

More specifically it relates to the mixing of aluminum and liquid chlorine to provide a catalyst for the cracking reaction of a hydrocarbon propellant mixture and utilizes the exothermic effects inherent therewith to initiate decomposition of a mixture such as acetylene and ethane. The use of the catalytic effects functions to aid in the decomposition of such an intermediate hydrocarbon product as methane and provide for the release of a higher percentage of hydrogen.

Prior gun systems of the character employing hydrocarbons as a propellant have used primers such as, lead azide, or potassium chlorate as an oxygen donor, and a combustible material such as the carbohydrate, sugar, or have utilized the burning of an iron wire by electric current for this purpose. While these materials or methods have provided the desired priming effect the catalyst was provided separately therefrom since the reaction product from the instant detonation did not provide any catalytic effect usable in the hydrocarbon decomposition initiated therefrom.

It is a feature of the instant invention to provide in a single reaction both a hydrocarbon decomposition reaction primer and a catalyst product for use in the decomposition reaction.

One object of the invention resides in the utilization of an exothermic reaction for decomposition detonation of a hydrocarbon propellant which produces as a product of this reaction, a catalyst for the decomposition of the explosive propellant.

Another object of this invention resides in the production of a catalyst contemporaneously with primer action which obviates the necessity for the introduction of additional catalyst material into the reaction chamber.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing wherein:

The diagrammatic drawing relates to a typical geometric arrangement of the invention for discharge in a reaction chamber of a gun.

Referring now to the drawing there is shown a cartridge case **1** having a primer therein at **2** for severance of the lightweight diaphragm seal **4** located between the aluminum powder and gunpowder mixture **5** and the liquid chlorine chamber **6**.

After the liquid chlorine at **6** is mixed with the aluminum powder the heavier diaphragm **7** is ruptured to admit the catalystic reaction-product into the reaction chamber **8** of the gun **9**. The exothermic reaction between the aluminum and chlorine liquid is also sufficient in combination with the gun powder to detonate the hydrocarbon propellant introduced into the reaction chamber **8** through port **10**.

While a primer of an impact variety is shown at **2** it is to be understood that an electrical squib of well known character may be utilized in the gun **9** for discharge of the primer with a consequent burning of the gun powder to provide rupturing of the seal **4**. The hydrocarbon propellant decomposition reaction occurring in chamber **8** discharges the projectile **11** from the gun bore **12**.

An alternate arrangement may be provided wherein the reaction chamber is incorporated as a part of the casing **1** for use in the conventional type gun. This assembly may be of a semi-fixed nature or the projectile may be attached to the case in a fixed ammunition arrangement as desired.

Obviously many modifications and variations are possible in the 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 as new and desired to be secured by Letters Patent of the United States is:

1. The method of propelling a projectile from a gun by detonating in the chamber of the gun a primer mixture containing a first component of a catalyst forming exothermic reaction mixture so as to mix said first component with a second component of said reaction mixture, and simultaneously introducing the catalyst so formed into a charge of acetylene and ethane in the gun chamber and, utilizing the heat from said reaction to initiate the dissociation of said charge.

2. The method of claim 1 in which said first component is aluminum and said second component is chlorine.

3. The method of claim 2 in which said propellant charge is 42 to 66 percent acetylene and the remainder ethane.

4. A firing device for providing heat and a catalyst for the decomposition of a propellant charge of acetylene and ethane in a gun chamber comprising a casing adapted to be inserted into a gun chamber, means forming two adjacent chambers in said casing, a charge of explosive and aluminum in the first said chamber, a charge of liquid chlorine in the second said chamber and means operative to detonate said explosive causing said aluminum and chlorine to mix and react giving off heat, forming aluminum chloride and introduce said aluminum chloride into said gun chamber.

5. A firing device for providing heat and a catalyst for the decomposition of a propellant charge of acetylene and ethane in a gun chamber which comprises a casing having a cylindrical side wall, an end wall sealing one end of the casing, a rupturable diaphragm sealing the other end of said casing, a lightweight diaphragm attached to said side wall intermediate said end wall and said rupturable diaphragm, said lightweight diaphragm, side wall and end wall forming a first sealed chamber, said lightweight diaphragm, rupturable diaphragm and side wall forming a second sealed chamber, a charge of mixed

explosive and powdered aluminum in said first chamber, a charge of liquid chlorine in said second chamber, and means operative to detonate said explosive causing said lightweight diaphragm to part and said aluminum and chlorine to mix and react exothermically to form aluminum chloride, rupturing said rupturable diaphragm and introducing said aluminum chloride into said propellant charge in said gun chamber.

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