

PATENT SPECIFICATION



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COMPLETE SPECIFICATION.

Improvements in Explosive Materials.

I, CHRISTEN JOHANNES STAUTSBÖLL LUNDSSGAARD, a Danish subject, of 13, Skolegade, Vejle, Denmark, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of the invention is to provide an explosive which has a high explosive power and a high degree of stability and which advantageously may be used for any military or civil purpose where explosives are employed.

Another object of the invention is to provide an explosive of the kind described which shall be substantially insensitive to moisture.

A further object of the invention is to provide a detonator containing my new explosive.

With these and other objects in view the explosive consists of or comprises a perchlorate of a methyl-substituted ammonia or tetramethylammonium.

It is a well-known fact that efficient and stable explosives can be produced by the action of perchloric acid or perchloric compounds upon cyclic ammonia compounds. Attempts have been made to produce perchlorates of aliphatic amino-compounds, viz. ethylenediamine and dicyandiamine, for explosive purposes, but so far as I am aware these substances have not come into use owing to their hygroscopic character and high cost of production. Betaine perchlorate has also been proposed as suitable as an explosive. It has now been found in practice that efficient and stable explosives can be obtained by the action of perchloric acid or perchloric compounds upon methylamine, dimethylamine, trimethylamine, tetramethylammonium compounds or compounds containing one or more of said substances whereby the corresponding perchlorates are formed. Such per-

chlorates are substantially insensitive to moisture—except the perchlorate of dimethylamine. Thus the perchlorate of methylamine certainly is freely soluble in water, but it is only slightly hygroscopic, while the perchlorate of tetramethylammonium dissolves with difficulty in water. Moreover, these substances are very stable. Thus they may be subjected to a temperature of 150° C. for a long period and may be stored for several years without decomposition. An explosive of the kind described which has an especially high explosive power is the perchlorate of methylamine. This may be produced, for instance, by neutralising dilute perchloric acid by a solution of methylamine and subsequent evaporation and crystallisation. It is found in practice that 0.25 grams of the perchlorate thus produced compressed in a copper cap by a pressure of 1500 kilos per square cm. and ignited by a charge of 0.4 grams mercuric fulminate forms a hole of a diameter of about 8—9 m/m. in a lead plate of 7 m/m. thickness, when the cap is placed vertically upon the surface of the lead plate. This experiment shows that the substance in question has an exceptionally high explosive action and efficiency which partially is due to its composition with respect to the proportions of the carbon, hydrogen and oxygen which it contains. Furthermore, this perchlorate can be produced at low cost, since the methylamine may be easily obtained by hydrogenation of hydrocyanic acid or by distillation of sugar residues. This explosive may therefore successfully be used for military and civil purposes (as charge for mines or shells or as a mining explosive and the like purposes) either in pure state or mixed with other substances, such as other explosives or substances which will lower the explosion temperature.

For instance the mixture may contain

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oxygen yielding substances, such as potassium perchlorate, ammonium nitrate or the like, in cases where a complete combustion of the carbon and hydrogen is desired; or the mixture may contain oxygen absorbing substances, such as aluminium powder or other metal powders, in cases where a high explosion temperature is desired; if it is desired to lower the speed of detonation or to render the explosive more or less plastic, organic substances such as saw-dust or cork powder, or liquid organic substances, such as petroleum distillates, may be added; when a low explosion temperature is of value, the mixture may contain sodium chloride, sodium sulphate, potassium chloride, magnesium sulphate or the like in the well known manner. Moreover it may advantageously be used as an intermediate charge in detonators, exploders or the like. Furthermore, the pure explosive or mixtures containing it may be mixed with carbonates or hydroxydes of sodium, calcium, magnesium or the like, in order to neutralise the acid combustion products which are formed by the explosion.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

1. An explosive comprising a perchlorate of methylamine, dimethylamine, trimethylamine or tetramethylammonium. 35

2. An explosive comprising a compound produced by the action of a perchloric compound upon methylamine, dimethylamine, trimethylamine or a compound of any of these, or upon a tetramethylammonium compound. 40

3. An explosive containing the perchlorate of mono-methyl-amino. 45

4. An explosive as defined in any of the preceding claims containing, besides the perchlorate, a substance that yields oxygen or absorbs oxygen.

5. An explosive as defined in any of the preceding claims containing a substance which will lower the explosion temperature. 50

6. An explosive as defined in any of the preceding claims containing a substance which will neutralise acid combustion products. 55

7. A detonator containing a perchlorate of methylamine, dimethylamine, trimethylamine or tetramethylammonium. 60

Dated this 27th day of August, 1921.

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