

UNITED STATES PATENT OFFICE.

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EXPLOSIVE COMPOUND AND PROCESS OF PRODUCING SAME.

No Drawing.

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To all whom it may concern:

Be it known that I, HAROLD A. LEWIS, a citizen of the United States, and a resident of Woodbury, in the county of Gloucester and State of New Jersey, have invented certain new and useful Explosive Compounds and Processes of Producing Same, of which the following is a specification.

My invention relates particularly to a process for producing a new explosive of advantageous character and the product thereof. The object of my invention is to provide a new and useful explosive compound suitable for use in detonators and so-called booster charges. My process furnishes a simple and economical means of producing explosives of the nitro-nitrate class where the nitric ester side chain is attached to the benzene nucleus through oxygen.

I have discovered that the condensation product of a nitro-chlor aromatic compound with a polyhydric alcohol nitrates readily in the presence of sulphuric and nitric acid, forming an aromatic compound having a plurality of nitro groups attached to the ring and a side chain comprised of a nitric ester of an aliphatic alcohol attached to the ring through oxygen. For example, if I condense dinitrochlorbenzene with a dihydric alcohol such as ethylene glycol, I obtain dinitrophenoxy-ethanol which on nitration yields trinitrophenoxy-ethyl nitrate. Other glycols such as propylene and trimethylene glycol can be treated in the same manner yielding the corresponding trinitrophenoxy-alkyl nitrates, such substances constituting valuable explosive compounds. Likewise dinitrochlorbenzene condensed with a polyhydric alcohol such as glycerol gives dinitrophenoxy-glycerol, which on nitration gives trinitrophenoxy-glycerol dinitrate. Although the exact details of the various steps of my process may be varied, I have found the following to yield a very satisfactory explosive compound, starting with dinitrochlorbenzene and ethylene glycol:—

100 parts by weight of 2, 4-dinitrochlorbenzene are dissolved in 322 parts by weight of ethylene glycol. To this is added an ethylene glycol solution of NaOH made by dissolving 20 parts of NaOH in 12 parts of water and adding 322 parts of glycol. The

mixture is heated at 90° to 100° C. for ½ hour, during which time sodium chloride crystallizes out. The hot mixture is then drowned in about 600 parts of water and the dinitrophenoxy-ethanol separated. 100 parts by weight of this product, after drying, are then dissolved in 1000 parts by weight of 95% sulphuric acid and the solution slowly added to 300 parts of nitric acid (1.47 sp. gr.) which is constantly agitated and kept at 30–35° C. The temperature is then raised and kept at 40° to 50° for one hour, after which the mixture is drowned in water and the crystalline product separated and washed by any one of the well known methods. The crude product obtained by me in following the process, as described above, gave a product melting at 101°–102° C. When recrystallized from benzene it melted at 105°–106° C. The nitrate nitrogen as determined by nitrometer was 4.23% as compared with the theoretical value of 4.40% for trinitrophenoxy-ethyl nitrate. The product flashed when heated on a steel spatula and detonated when primed with fulminate of mercury.

Trinitrophenoxy-ethyl nitrate, as produced by my process, is particularly well adapted for use in blasting caps or in so-called booster charges, or in any of the numerous explosive devices for which such explosives as trinitrotoluene, picric acid and tetryl have proved adapted. For example, in a blasting cap shell, I have found that a compressed charge consisting of 3 grains of trinitrophenoxy-ethyl nitrate in the base of the shell, and a primer of 4 grains of a 90–10 mixture of fulminate and chlorate with a superimposed inner capsule exhibits an explosive force entirely comparable with that given by tetryl loaded and fired under the same conditions.

While I have described my process in detail only as applied to the condensation and nitration of dinitrochlorbenzene and ethylene glycol, it is understood that other nitro-chloro aromatic compounds, such, for example, as dinitrochlorotoluene, may be used, as well as various polyhydric alcohols other than those specifically mentioned above. My process is also not confined to the particular method of condensation or nitration given in the specific example.

I claim:

1. A process of producing an explosive compound which comprises condensing a polyhydric alcohol, having not more than 3 hydroxyl groups, with a nitro-chlor aromatic compound and nitrating the product of condensation.
 2. A process of producing an explosive compound which comprises condensing a glycol with a nitro-chlor aromatic compound and nitrating the product of condensation.
 3. A process of producing an explosive compound which comprises condensing ethylene glycol with dinitrochlorbenzene and nitrating the product of condensation.
 4. A process of producing an explosive compound which comprises nitrating the product obtainable by the condensation of a glycol with dinitrochlorbenzene.
 5. A process of producing an explosive compound which comprises nitrating the product obtainable by condensing ethylene glycol with 2, 4-dinitrochlorbenzene.
 6. A process of producing an explosive compound which comprises nitrating dinitrophenoxy-ethanol.
 7. An explosive comprising an organic compound of the aromatic series, having a plurality of nitro groups attached to the ring and a side chain comprising a mono nitrate of an aliphatic alcohol attached to the ring through oxygen.
 8. An explosive comprising a nitro-aryloxy-alkyl nitrate.
 9. An explosive comprising a polynitrophenyloxy-alkyl nitrate.
 10. An explosive comprising the compound obtainable by nitrating the product resulting from the condensation of a glycol containing less than five carbon atoms with a nitro-chlor aromatic compound of the benzene series.
 11. An explosive comprising a nitrated dinitrophenoxy-ethanol.
 12. An explosive comprising trinitrophenoxy-ethyl nitrate.
- In testimony whereof I affix my signature.

HAROLD A. LEWIS.