UNITED STATES PATENT OFFICE.

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EXPLOSIVE.

940,580. Specification of Letters Patent. Patented Nov. 16, 1909.

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To all whom it may concern:

Be it known that I, CLARENCE U. BUCK, a citizen of the United States, residing at Wellsboro, in the county of Tioga and State of Pennsylvania, have invented certain new and useful Improvements in Explosives, of which the following is a specification.

The object of this invention is to produce a new explosive by a new and improved process of manufacture, so that the resulting compound is so insensitive to concussion as to enable it to be fired from modern ordnance, being absolutely safe for all practical uses and being incapable of being exploded except by a strong detonator.

The invention also has for its object a compound of this character which is able to stand all climatic changes without absorbing moisture, and which may be melted by steam or other suitable manner, and cast into sticks for the purpose of blasting in mines, quarries or formed for other uses in general, as in shells for military and sportsman's purposes, and which is capable of being stored any length of time and is stable under all conditions.

The invention consists of tri-nitro-phenol or picric acid ($C_6H_2(NO_2)_3OH$) and di-nitro-phenol ($C_6H_4N_2O_5$) together with soluble gun-cotton or pyroxylin, the three being mixed and melted together and forming a gelatinous mass. These ingredients are combined in about the following proportions: fifty parts tri-nitro-phenol, or picric acid, fifty parts di-nitro-phenol and about four parts soluble gun cotton. These ingredients are placed in a suitable receptacle and heated at a low temperature to bring them to melting-point, after which the temperature is raised to about 350° F., and the mass agitated in order to bring about a thorough mixture of the same. By this process I obtain the product which has a melting point of about 142° F. This is designated as mixture No. 1.

In manufacturing this explosive for commercial purposes in order to make the same cheaper and still retain its great shattering power, I use in addition to the aforesaid compound, the following ingredients which will be known as mixture No. 2, namely; a solid inorganic oxidizing agent, such as barium nitrate, and paraffin, preferably in the proportion of fifty pounds of barium nitrate to about four pounds two ounces of the paraffin. The barium nitrate is heated to about 130° F. to drive off all moisture, and while still warm the paraffin previously melted is poured over the heated barium nitrate and stirred until thoroughly incorporated therewith. These two mixtures are combined in about the following proportions: No. 1, ten pounds, No. 2 ten pounds. Five ounces of carbon are preferably included also among the ingredients of the explosive, and I have found by actual test that by using cannel coal for this purpose, somewhat better results are obtained than by using charcoal or other forms of carbon.

In order to obtain the greatest efficiency I find that (although picric acid does not contain sufficient oxygen to oxidize its own carbon) by adding more carbon I get a much more powerful explosive, and that when the oxygen is in excess it has a tendency to diminish the power of the explosive. Therefore, when an explosive is required for coal mining or stone quarrying, by using more barium nitrate or other oxygen-producing agent, I obtain a product that is more desirable.

In preparing mixture No. 1, I preferably employ the picric acid and di-nitro-phenol in the proper proportions and sift the same into a mixing machine and then sift in the soluble gun cotton which has been finely pulped or macerated, and thoroughly mix these ingredients together, in which condition they are ready to melt.

The object of collodionizing the gun cotton in melted di-nitro-phenol and tri-nitro-phenol is to separate the molecules of the different substances a greater distance from each other to insure safety. When the gun cotton is added to the molten phenols at a lower temperature as before described, the product is a thick viscid mass, but on raising the temperature to about 350° F. the mass breaks up and becomes more fluid, in which state it continues at all temperatures until solidified.

In preparing the explosive to be cast into shells or other forms for use in guns of large or small caliber I prefer to add mixture No. 2 to No. 1 while the latter is still in a molten state, as it melts more readily and with less danger of igniting. In preparing the explosive in this manner, coal or carbon is to be added to mixture No. 2, but when preparing the explosive for blasting pur-

poses or the like, in which instance an excess of barium nitrate is employed, mixture No. 1 is ground very fine, after it is solidified and then mixture No. 2 is added thereto, since the amount of barium nitrate used in the lower grades where a less powerful explosive is required will not admit of the whole mass being melted together, owing to the fact that the amount of the mixture No. 2 will not be taken up by mixture No. 1 while the latter is melted.

Having thus described the invention, what I claim as new is:

1. The process of preparing an explosive compound which consists of fusing a mixture of tri-nitro-phenol, di-nitro-phenol and a nitro-carbo-hydrate and then raising the temperature to about 350° F.

2. The process of producing an explosive compound which consists of mixing tri-nitro-phenol, di-nitro-phenol and soluble gun cotton in about the proportions herein specified, and applying heat to melt the mixture and then adding to the mass barium nitrate combined with paraffin.

3. The process of producing an explosive compound consisting of reducing tri-nitro-phenol, di-nitro-phenol and soluble gun cotton, mixed in about the proportions herein stated to a fluent mass by the application of heat then combining with said mixture barium nitrate and paraffin, and finally adding to the mass, carbon, the several ingredients being combined in the proportions substantially as herein stated.

4. The process of producing an explosive, consisting in combining tri-nitro-phenol, di-nitro-phenol and soluble gun cotton in the presence of heat, producing a molten mixture, then heating barium nitrate and combining the same while warm with molten paraffin, and finally mixing the two compounds.

5. In the process of producing an explosive compound, the incorporation of tri-nitro-phenol, di-nitro-phenol and soluble gun cotton, in about the proportions stated, by heating the same to produce a gelatinized mass, then raising the temperature to about 350° F. and thoroughly agitating the mass to insure compounding of the ingredients to produce a product having a melting point of about 142° F.

6. The process of preparing an explosive compound, consisting of applying heat to melt a mixture of tri-nitro-phenol, di-nitro-phenol and a nitro-carbo-hydrate and then adding to the mass a compound of a solid inorganic oxidizing salt and paraffin.

7. An explosive compound consisting of fifty parts each of tri-nitro-phenol and di-nitro-phenol associated with four parts of gun cotton.

In testimony whereof I affix my signature in presence of two witnesses.

CLARENCE U. BUCK. [L. S.]

Witnesses:
GEO. SUTTON, Jr.,
CLARENCE SMITH.