

UNITED STATES PATENT OFFICE.

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EXPLOSIVE AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 674,291, dated May 14, 1901.

Application filed June 27, 1900. Serial No. 21,709. (No specimens.)

To all whom it may concern:

Be it known that we, JONAS EMILE BLOMÉN and HENRY C. ASPINWALL, citizens of the United States, and residents of Pompton township, in the county of Passaic and State of New Jersey, have invented a new and useful Base for High Explosives and Method of Making Same, of which the following is a specification.

Our invention relates to a high explosive and method of making same, which high explosive may form a base for other high explosives or for celluloid compounds.

Our object is to produce an explosive which we can regulate in such a manner as to obtain a greater or lesser degree of force, as may be desired or may be most suitable for the purpose for which it may be intended, and to produce an explosive that can be safely manufactured and handled and at a relatively low cost.

The nitration of organic substances by means of suitable acids is well known. Heretofore such substances have been nitrated singly and definite results have been obtained, such as nitroglycerin, nitrocellulose, nitrobenzene, and others.

Our invention contemplates, broadly speaking, the nitration of two or more substances together or, in other words, the co-nitration of organic substances.

As the result of many experiments we have discovered that it is practicable to co-nitrate two or more organic substances.

The co-nitration of any two or more of the following substances—cellulose, an aromatic hydrocarbon, and the hydroxyl derivatives of the hydrocarbons—we have found to be practicable.

In using the term "cellulose" it is intended to include wood and plant fiber in general, without raising the question as to whether it is technically included in the term "cellulose" or not.

As examples of the aromatic hydrocarbons we mention benzene, toluene, and naphthalene and of the hydroxyl derivatives of the hydrocarbons phenol and cresol.

When one or more of the aromatic hydrocarbons or the hydroxyl derivatives are co-nitrated with cellulose or lignose, a breaking

up, rending, or tearing of the fibers is observed, rendering the resulting mass to a great extent friable. A solvent effect of one substance upon the other under the conditions mentioned is also observed. The result of this co-nitration is an explosive combining the explosive effects and properties of nitrocellulose with the explosive effects and properties of the nitrohydrocarbons or nitrated hydroxyl derivatives of the hydrocarbons. The explosive effect of nitrocellulose has been observed to be more rapid than that of the other substances mentioned. The solvent effect of the co-nitrated substances upon each other which we have already mentioned results in an intimate mixture partially or wholly dissolved together, forming a colloidal mass. This colloid will be more or less complete, depending upon the proportions of the cellulose and the aromatic hydrocarbons or the hydroxyl derivatives of the hydrocarbons. The product obtained by these means has been found to be comparatively insensitive to shock or friction and is the explosive base sought and which forms the subject-matter of this application. The explosive thus formed may be made to fulfil other requirements of an explosive substance, as follows: We may add one or more of the oxygen-bearing salts—such, for example, as the nitrates, the chlorates, or the perchlorates of barium, sodium, potassium, and ammonium. We may also add an inert organic substance—such as camphor, vaseline, petrolatum, or castor-oil—should we desire to produce a celluloid or should we desire to slow down the combustion and obtain a less-violent explosive. The addition of the oxygen-bearing salts or inert organic substances may readily be effected by means of any of the well-known apparatuses for mixing or incorporating substances. The addition may be effected in a dry state or the substances may be wet or the co-nitrated product may be wholly or partially dissolved in a solvent and the substances then added. As an example of the solvents that can be used may be mentioned acetone, amylacetate, methyl alcohol, or acetic ether.

Our present application is limited to a high explosive or base for high explosives formed by the co-nitration of cellulose and a hydro-

carbon and may be practically carried into effect as follows: Take one of the aromatic hydrocarbons—such, for example, as naphthalene—and bring it to a liquid state by heat, or, on account of the ease with which naphthalene resublimates when heated, we may, if desired, bring it to a liquid state by first partially nitrating it and then melting it. To the melted naphthalene we add cellulose, which is mixed in and macerated with the melted naphthalene. The following proportions will produce satisfactory results: Two parts, by weight, of naphthalene and one part, by weight, of cellulose, and these are macerated together at about 70° centigrade. During the maceration the cellulose fibers will be somewhat broken up. After the mixture is cooled it will be found to be friable and less bulky than the cellulose alone before it was put in. A smaller amount of acid, therefore, can be used than is required in the nitration of cellulose alone. The mixture thus formed may then be nitrated by any of the well-known methods that are employed in the nitration of cellulose, the strength of the acid varying according to the nitration desired.

We have found that an acid mixture containing from sixteen to thirty per cent. nitric acid and twenty-five to fifty per cent. sulfuric acid will produce satisfactory results.

The hereinabove-described mixture of cellulose and naphthalene is dipped in the acid mixture in the proportion of about one part, by weight, of the cellulose-and-naphthalene mixture to three and one-half parts, by weight, of the acid mixture and allowed to remain for a period of about twenty-four hours, the temperature at time of dipping 30° centigrade and gradually raised up to about 80° centigrade. The temperature and the time of immersion will vary with the nitration desired, the strength of the acid, and the relative proportion of the ingredients. The nitration may also be increased by renitration or by adding a stronger acid mixture after the first reaction has taken place and the temperature begins to go down. After the nitration is completed, as above described, the product is freed from excess of acid by any of the well-known means such as are employed in the manufacture of nitrocellulose. It is then thoroughly washed in cold and hot water in order to completely free it from acid and thoroughly purify it. The product is

now in a state in which it may be used as a base for explosives or in the manufacture of celluloid.

Claims to the high explosive or base for high explosives and method of making such explosive or base, formed by the co-nitration of cellulose, a hydrocarbon, and a hydroxyl derivative of a hydrocarbon and also by the co-nitration of cellulose and a hydroxyl derivative of a hydrocarbon, are made in our copending application, Serial No. 36,051, filed November 10, 1900.

If we desire to use this base in producing another variety of high explosive, we may take any number of parts of the co-nitrated product above described and add any number of parts of one or more oxygen-bearing salts. For example, forty parts of the co-nitrated product above described and sixty parts of an oxygen-bearing salt, such as sodium nitrate, will produce an efficient high explosive. For use in firearms and as smokeless powder we may add to the co-nitrated product one or more of the oxygen-bearing salts, and we may also add a neutral substance—such, for example, as paraffin, vaseline, or castor-oil—and to act as a deterrent to prevent too-rapid combustion, we have found that a mixture of seventy parts of such a co-nitration product as above described, twenty-seven parts of barium nitrate, and three parts of potassium nitrate gives satisfactory results. Such a mixture may be formed into grains of suitable sizes and shapes by any of the well-known means usually employed.

What we claim is—

1. An explosive consisting of a colloided, comminuted, friable mass containing the following co-nitrated substances, viz: cellulose and a hydrocarbon, substantially as specified.
2. The method of forming an explosive consisting in nitrating together cellulose and a hydrocarbon, substantially as specified.

In testimony that we claim the foregoing as our invention we have signed our names, in presence of two witnesses, this 5th day of June, 1900.

JONAS E. BLOMEN.
HENRY C. ASPINWALL.

Witnesses:

FREDK. HAYNES,
EDWARD VIESER.