

UNITED STATES PATENT OFFICE.

GEORGE BENEKÉ, OF SOUTHPORT, ENGLAND.

EXPLOSIVE AND METHOD OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 608,316, dated August 2, 1898.

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To all whom it may concern:

Be it known that I, GEORGE BENEKÉ, of Southport, England, have invented certain new and useful Improvements in the Manufacture of Explosive Compounds, of which the following is a specification.

Various explosive compounds have already been invented in which nitrate of ammonium and bodies of a resinous or hydrocarbon nature have been employed, sometimes with the addition of oxidizing materials, such as chromate or bichromate of sodium or potassium.

Now my invention consists in the incorporation with nitrate of ammonium and a resinous body, with or without an oxidizing material, such as an alkaline chromate or bichromate, of sodium or potassium carbonate or bicarbonate.

My invention also includes a particular method of incorporating the alkaline carbonate or bicarbonate into the mixture in order to prevent increase in the hygroscopicity of the mixture, which would otherwise be liable to become hygroscopic to such an extent as to liquefy and become unfit for use. The novel method of incorporating the alkaline carbonate or bicarbonate is to mix it with the resin when the latter is in a melted or liquid or semiliquid state, prior to the incorporation of the resin with the ammonium nitrate. When sodium or potassium chromate or bichromate is to constitute one of the ingredients of the explosive compound, it is also similarly incorporated with the resin prior to the incorporation of the resin with the ammonium nitrate.

The manner in which I may carry the invention into effect is as follows: I melt five parts of resin, taking care that the temperature is not raised much above the melting-point of the resin, and when reduced to a fluid state I stir into it two and one-half parts of potassium bichromate (or its equivalent quantity of potassium chromate or sodium chromate or bichromate) and three-fourths part of sodium carbonate (or the equivalent weight of sodium bicarbonate, potassium carbonate, or potassium bicarbonate.) I do not confine myself to these proportions and may increase the proportion of potassium bichromate to about three and three-fourths parts and the proportion of the sodium carbonate

to one and one-half parts; but I prefer to keep within these limits. The mixture is maintained just above the melting-point of the resin and constantly stirred until the ingredients have been uniformly mixed, when the melt will present a dull-yellow color according to the quality of resin employed. The mixture should not, however, become green and dark, which is a sign of overheating. The mixture is then allowed to cool and ground to an extremely-fine powder, which its extremely-brittle character and absence of hygroscopic properties renders very easy. To eight or ten parts of this powder I then add about ninety or ninety-two parts of ammonium nitrate, which must have been previously dried, ground to an extremely fine powder, and again heated for about two hours at a temperature of 100° centigrade to drive off the last traces of moisture. The mixture of the resinous powder should be made in a revolving drum with the ammonium nitrate direct as it comes from the drying-oven and while still hot. In this way a more uniform mixture and better aggregation of the particles of the ingredients is effected, while in order to insure the absence of moisture it is preferable before packing the explosive or making up into cartridges to again heat the powder in a steam-jacket to 70° centigrade, a temperature insufficiently high to melt the resin or render it sticky.

The explosive manufactured as described above should be hermetically closed in cartridges or otherwise. It is specially suitable for blasting rock and stone in coal-mines, where coal-dust and pit-gas abound. It will not ignite them and is a most powerful explosive and quick in its action.

When the sodium or potassium chromate or bichromate is not to constitute one of the ingredients of the explosive compound, I may carry the invention into effect as follows: I melt one to one and one-half parts of resin, and then I stir into it one to one and one-half parts of finely-powdered sodium bicarbonate, (or an equivalent quantity of sodium carbonate or of potassium carbonate or bicarbonate.) I let the mixture cool and then grind it into a fine powder. I mix this intimately with five or four parts of resin ground to an extremely-fine powder. I add this mixture in a

cool state to ninety-three to ninety-four parts of finely-powdered ammonium nitrate, the latter having been previously heated to about 100° centigrade, and while still hot I intimately mix. The explosive compound thus made is slower in action than that in which the chromate or bichromate is present.

Whenever hereinafter the expression "chromate" is used, it will be understood to include either chromate or a bichromate, and whenever the term "carbonate" is hereinafter used it will be understood to signify either a carbonate or a bicarbonate.

What I claim, and desire to secure by Letters Patent, is—

1. The process of manufacture of explosive compounds in which ammonium nitrate, resin, an oxidizing material (such as alkaline chromate) and an alkaline carbonate, are employed, which consists in incorporating the alkaline carbonate and the oxidizing material with the resin when the latter is in a liquid state, then allowing the thereby-obtained mixture to cool, then reducing it to powder, and then incorporating it with the ammonium nitrate.

2. The process of manufacture of explosive compounds in which ammonium nitrate, resin and an alkaline carbonate are employed, which consists in incorporating the alkaline carbonate with the resin when the latter is in a liquid state, then allowing the thereby-obtained mixture to cool, then reducing it to powder and then incorporating it with the ammonium nitrate.

3. An explosive compound consisting of the following substances incorporated together in approximately the proportions stated, namely ammonium nitrate, a resin, an oxidizing material and an alkaline carbonate.

4. An explosive compound consisting of the following substances incorporated together in approximately the proportions stated, namely ammonium nitrate, a resin and an alkaline carbonate.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GEORGE BENEKÉ.

Witnesses:

WILLIAM PIERCE,

SAMUEL MCCREADY.