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IGNITION MIXTURE

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This invention relates to an improved ignition compound adapted more particularly for use in electric blasting caps.

It is well known that electric blasting caps include a shell containing an explosive charge comprising a base charge and a priming charge that are detonated by means of an electric firing assembly consisting of a bridge wire from which extend a pair of lead wires. The cap shell is closed by waterproofing and a seal. Further, the art often employs, within electric blasting caps, ignition compounds that are superimposed upon the explosive charge to facilitate the ignition of the explosive charge. The passage of an electric current through the firing assembly ignites the ignition charge which in turn causes the detonation of the explosive charge.

The general requirements of a satisfactory ignition compound are that it be easily ignited by a small amount of heat and that it will, when ignited, cause positive detonation of the explosive charge. Further an ignition compound, for use in electric blasting caps, should not, when ignited, detonate and interrupt the firing circuit as is the case of detonating compounds, for example, diazodinitrophenol and mercury fulminate, but should provide a very short increment of time between the application of the current and the interruption of the firing circuit, thereby allowing those caps, in the series, with individual slow-firing characteristics to become ignited. This firing characteristic of ignition compounds allows an increase in the number of blasting caps that may be fired in series with a definite firing current.

It is the object of this invention to produce an improved ignition compound suitable for use in electric blasting caps. A further object of this invention is to provide an ignition compound with firing characteristics that will allow an increased number of electric blasting caps to be fired in series with a definite circuit. Further objects will appear hereinafter.

Now in accordance with this invention, I have found that I may produce an ignition compound which, when used in electric blasting caps, has a low critical firing current, is readily ignited by electrical means, and insures positive detonation of the explosive charge, by intimately admixing a detonating compound with an oxidizing agent and a flame-producing agent.

The proportions of ingredients in my ignition composition may vary widely but are desirably within the following ranges; detonating compound about 10% to about 20%, oxidizing agent

about 10% to about 50%, and a flame-producing agent about 35% to about 75%. It is also desirable to have the ingredients in a finely divided dry state before they are admixed by any suitable means.

Among the detonating compounds that I may use in accordance with this invention are, for example, diazodinitrophenol or mercury fulminate. To insure complete and intimate admixing, it is desirable to control the particle size of the detonating compound being used and I have found that favorable results may be obtained with diazodinitrophenol by using a material having a particle size within the range of about 25 to about 200 microns in diameter and preferably about 50 to about 100 microns in diameter. Further when using mercury fulminate, I find it desirable to use material that will pass a #0 bolting cloth, 38 openings per lineal inch.

Among the oxidizing agents that I may use in accordance with this invention are, for example, barium nitrate, potassium nitrate, potassium chlorate or the like. I prefer to screen the oxidizing agent to be used through a 60 mesh sieve as material of such size allows very ready admixing with the other ingredients to be used.

Among the flame-producing agents that I may use in accordance with this invention are, for example, double base smokeless powder grains that, preferably, will pass a 60 mesh screen and will be retained on a 72 mesh screen; single base smokeless powder grains that, preferably, will pass a 100 mesh screen; nitrolactose, nitromanite, and nitrostarch grains that, preferably, will pass a 60 mesh screen.

Having now described in a general way the nature and purpose of my invention and the ingredients that I may use therein, I shall proceed with a more detailed description of specific examples thereof.

I prepared an ignition compound in accordance with this invention by admixing 15 parts by weight of diazodinitrophenol having a particle size of about 50 to about 100 microns diameter with 55 parts by weight of double base smokeless powder, all of which will pass a 60 mesh screen and will be retained on a 72 mesh screen, and 30 parts by weight of barium nitrate. The dry ingredients were mixed on a triangle mixing cloth until an intimate admixture was obtained.

A marked improvement in performance was obtained from electrical blasting caps containing a charge of the ignition compound of the afore-described specific example. The improvement may be definitely shown by a comparison of re-

sults obtained upon firing electrical blasting caps containing the aforesaid ignition compound and results obtained upon firing regular commercial electric blasting caps containing no such ignition compound.

In the following table the electric blasting caps were fired in series by a small commercial blasting machine.

Table 1

10	Number of regular commercial electric blasting caps in series	Number of failures
15	15	1
	10	0
	10	1
	8	1
	6	2
	6	0
20	Number of electric blasting caps containing an ignition charge in accordance with this invention in series	Number of failures
25	25	0
	25	0

It is apparent from the results given in Table 1 that electric blasting caps containing an ignition charge prepared as indicated in the aforesaid specific example have firing characteristics superior to those of the regular commercial electric blasting caps. It is well known to those skilled in the art that the number of caps that it is possible to fire will vary with the individual blasting machines used for testing. However, any particular blasting machine will give results which will show the same relative improvement of the caps of this invention over commercial caps shown in Table 1.

Another specific example of my ignition mixture consists of an admixture of 15% diazodinitrophenol, 30% barium nitrate and 55% nitrolactose. The diazodinitrophenol and barium nitrate of this mixture have the same particle size as the materials used in the preceding specific example and I have used nitrolactose that will pass a 60 mesh screen. Results obtained by using this admixture in electric blasting caps closely approximate those results given for the ignition admixture of Table 1.

While I have admixed the dry ingredients of my ignition compound on a triangle mixing cloth, I contemplate other suitable means of mixing these ingredients that will be well known to those skilled in the art. I may also mix the ingredients in a dry or wet state dependent upon the mixing means employed.

Ignition compositions in accordance with my invention will be found to be relatively free flowing and therefore easy to load into the electric blasting cap shells. These ignition compositions will also be readily ignitable by electrical means and effective for detonation of the explosive charge. While I have specified that my ignition compositions are for use in electrical blasting caps and are to be fired by electrical means, it is to be understood that I contemplate the use of my ignition compositions in other firing devices that are ignited by electric means or by the spit of a safety fuse.

It will be understood that the details and examples given hereinbefore are illustrative only, and in no way limiting on my invention as broadly described hereinbefore and in the appended claims.

What I claim and desire to protect by Letters Patent is:

1. An ignition composition comprising as ingredients, diazodinitrophenol, an oxidizing agent and a flame-producing agent from the group consisting of a nitrated carbohydrate and smokeless powder.

2. An ignition composition comprising as ingredients, diazodinitrophenol, about 10 to about 20%; an oxidizing agent, about 10 to about 50%; and a flame-producing agent from the group consisting of a nitrated carbohydrate and smokeless powder, about 35 to about 75%.

3. An ignition composition comprising as ingredients, diazodinitrophenol, about 10 to about 20%; barium nitrate, about 10 to about 50%; and smokeless powder, about 35 to about 75%.

4. An ignition composition comprising as ingredients, diazodinitrophenol, about 10 to about 20%; potassium chlorate, about 10 to about 50%; and nitrolactose, about 35 to about 75%.

5. An ignition composition comprising as ingredients, diazodinitrophenol, about 10 to about 20%; barium nitrate, about 10 to about 50%; and a double base smokeless powder, containing about 15 to about 35% nitroglycerin, about 35 to about 75%.

6. An ignition composition comprising as ingredients diazodinitrophenol about 15%, barium nitrate about 30%, and smokeless powder about 55%.

7. An ignition composition comprising as ingredients diazodinitrophenol about 10% to about 20%, barium nitrate about 10% to about 50%, and nitrolactose about 35% to about 75%.

8. An ignition composition comprising as ingredients diazodinitrophenol about 15%, barium nitrate about 30%, and nitrolactose about 55%.

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