

UNITED STATES PATENT OFFICE.

JESSE B. BRONSTEIN, OF ALLENTOWN, PENNSYLVANIA.

EXPLOSIVE.

988,858.

Specification of Letters Patent.

Patented Apr. 4, 1911.

No Drawing.

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To all whom it may concern:

Be it known that I, JESSE B. BRONSTEIN, a citizen of the United States, residing in Allentown, Pennsylvania, have invented certain Improvements in Explosives, of which the following is a specification.

My invention relates to the manufacture of nitro starch blasting powders, and its object is to improve powders of this character by reducing their temperature of explosion.

Nitro starch powders as now on the market, consist of a mixture of nitro-starch, the explosive base; small percentages of a stabilizing agent; a suitable oxygen bearer, usually nitrate of soda; and other ingredients in small percentages, such, for example, as an oil for giving the desired consistency. These powders vary in grade from those containing approximately twenty per cent. (20%) by weight of the explosive base, up to those containing approximately sixty per cent. (60%). In these powders as heretofore made, there has existed a more or less considerable oxygen excess, the effect of which is to render the temperature of explosion unnecessarily high, which is a disadvantage where the powder is used in gaseous coal-mines. I have found that this oxygen excess may be materially decreased, and the temperature of explosion lowered without materially affecting the efficiency of the powder, by introducing into the mixture, to replace a portion of the oxygen bearer, a reasonably large percentage of calcium carbonate in the crystalline form in which it is found in marble dust. The proportion of the calcium carbonate to such total aggregate of the mixture will, of course, vary according to the grade of the powder, and also to some extent according to the precise character of the other ingredients. I prefer to introduce the calcium carbonate in such amount as will leave just a slight excess of oxygen upon explosion, that is to say, such an amount as will cause the oxygen present to be slightly more than sufficient to oxidize all of the oxidizable elements to the highest degree of oxidation. My reason for this is that an oxygen deficiency results in the production of carbon monoxid which in some cases is considered objectionable. But as the production of carbon monoxid is in many cases permissible, and its presence does not in any way prevent the obtaining of my desired result, that is, the reduction of the temperature of explosion, it will be

understood that my invention is not limited to the use of calcium carbonate in such proportion as will leave an oxygen excess.

I suggest the following as suitable proportions for obtaining a slight excess of oxygen, as I prefer, using for the purpose of illustration, a nitro starch powder containing nitro starch, a small percentage of a stabilizing agent, nitrate of soda as the oxygen bearer, and a small percentage of oil to give consistency. In a powder of this character, of a 25% grade, that is, one in which the explosive base is approximately 25% by weight of the entire mixture, I have found that approximately 45% of marble dust and 30% of the nitrate of soda, will produce the desired result. In a powder of 35% grade, I have successfully used 35% of nitrate of soda and 30% of marble dust; in a 45% powder 35% of nitrate of soda and 20% of marble dust; and in a 55% powder, 40% of nitrate of soda and 5% of marble dust. It will be understood, of course, that these figures are only approximate, as in each case allowance should be made for the small percentages of added materials present in the powder. One skilled in the art will be able to readily ascertain by the use of chemical equation just what proportion of calcium carbonate should be used for any given powder to leave just a slight excess of oxygen, or to leave a greater excess, or obtain a deficiency of oxygen, if that be desired, but I have given the foregoing illustrations as indicating what I have found in practice to be suitable proportions for my preferred purpose.

While I prefer to use for the purposes of my invention marble dust as stated, I do not wish to be limited to that, as other agents may be used to produce the same result. I prefer calcium carbonate in the form of marble dust not only because of its chemical and physical characteristics, including its relatively high specific gravity and hardness but also because it is cheap and readily obtainable. Other common mineral materials, however, which contain sufficient amounts of calcium carbonate and have sufficient specific gravity and hardness to effect the desired result may be used, as well as pulverized rock or earth materials having the required form and containing other carbonates, such for example as magnesium carbonate. The material employed, I have discovered, should not be soft but should be of a hardness approxi-

mating that of marble dust, or harder materials may be used.

As before stated, it will be understood that I do not wish to limit myself to the use of the marble dust, or equivalent material, in any exact proportion, as my invention in its broader aspect involves broadly, the use of said materials in such proportions as will have the effect of reducing the temperature of explosion without rendering the powder inefficient. Calcium carbonate in the form specified making up 10% to 70% of the added material of the powder can be successfully used.

I claim:

1. A nitro-starch powder containing a crystalline carbonate whose hardness and specific gravity are approximately those of marble dust added in such proportion as to reduce the temperature of explosion in substantially the manner set forth.

2. A nitro-starch powder containing a crystalline carbonate having approximately the physical properties of marble dust added in such proportion as to leave but a slight oxygen excess upon explosion.

3. A nitro-starch powder containing nitro-starch and added material, ten per cent. to 70 per cent. by weight of said added material being a crystalline carbonate whose hardness and specific gravity are approximately those of marble dust.

4. A nitro-starch powder containing a crystalline mineral material which has for its principal constituent a carbonate, and the hardness and specific gravity of which are approximately those of marble dust, said ma-

terial being added in such proportion as to reduce the temperature of explosion.

5. A nitro-starch powder containing a crystalline mineral material which has for its principal constituent a carbonate, and the hardness and specific gravity of which are approximately those of marble dust, said material being added in such proportion as to leave but a slight oxygen excess upon explosion.

6. A nitro-starch powder containing nitro-starch and added material, 10 per cent. to 70 per cent. by weight of said added material being a crystalline mineral material which has for its principal constituent a carbonate, and whose hardness and specific gravity are approximately those of marble dust.

7. A nitro-starch powder containing marble dust added in such proportion as to reduce the temperature of explosion in substantially the manner set forth.

8. A nitro-starch powder containing marble dust added in such proportion as to leave but a slight oxygen excess upon explosion.

9. A nitro-starch powder containing nitro-starch and added material, 10 per cent. to 70 per cent. by weight of said added material being marble dust, substantially for the purpose set forth.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

JESSE B. BRONSTEIN.

Witnesses:

CHARLES H. HOWSON,
WM. A. BARR.