

UNITED STATES PATENT OFFICE.

JESSE B. BRONSTEIN, OF OAKLAND, CALIFORNIA.

EXPLOSIVE.

986,900.

Specification of Letters Patent.

Patented Mar. 14, 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, and a resident of Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Explosives, of which the following is a specification.

This invention has as its object the production of an ammonium nitrate explosive that will be sufficiently sensitive to be fired with an ordinary detonating cap, and also rapid and effective in its action for blasting hard rock and for other purposes.

This explosive is produced by mixing and incorporating together ammonium nitrate, sugar (a crystalline carbohydrate) and finely sub-divided iron pyrites which is a metallic substance that under favorable conditions rapidly oxidizes with the evolution of intense heat, in about the following proportions:—ammonium nitrate 76 to 88 parts, preferably 82.2 parts; sugar 6 to 12 parts, preferably 9 parts; iron pyrites 6 to 12 parts, preferably 8.8 parts by weight. These ingredients are mixed together in a dry state by means of a rolling mill or pulverizing barrel, such as is used in the manufacture of safety explosives, and the operation is carried on until the ammonium nitrate and carbohydrate are reduced to a pulverulent state and the ingredients are thoroughly mixed. Taking the said substances within the limits above given and preferably in the proportions of ammonium nitrate 82.2 parts, sugar 9 parts and fine metallic particles 8.8 parts the mixture possesses a relatively high explosive coefficient, and is readily fired with an ordinary detonating cap. When tested in a Trauzl cylinder it indicates an explosive force of 305 c.c. using seven grams of the mixture.

By varying slightly the proportions of the several ingredients within the limits herein above given the explosive coefficient can be varied, and while reduced somewhat below the degree above given, an explosive sufficiently powerful and active for many purposes can be obtained with a smaller propor-

tion of the explosive base. For example, by increasing the proportion of the iron pyrites from 8 to 11 parts, it is possible to reduce the proportion of the ammonium nitrate and to reduce also the proportion of the sensitizing agent. A mixture of ammonium nitrate 81.5 parts, sugar 7.5 parts and iron pyrites 11 parts by weight, has an explosive force of 285 c.c. under a test of seven grams in a Trauzl cylinder.

In all forms or grades of the explosive of my invention, it should be mentioned that the sugar (crystalline carbohydrate) employed to sensitize the ammonium nitrate is used only in sufficient proportion to secure that end, and is not used to change or modify the character of the fumes or explosion gases, nor to overcome the liability of the composition when fired in a mine or in confined quantities to ignite a coal-dust-laden atmosphere, or fire damp. The iron pyrites is an effective agent in promoting the combustibility of the compound, rendering the explosive energy more nearly instantaneous throughout the mass.

As I am aware that sugar and iron pyrites and other forms of metallic particles have been employed in the manufacture of explosive compositions, I do not claim broadly the employment of those ingredients either separately or together. But I am not aware that an explosive having the desirable characteristics of exploding with an ordinary detonating cap and of having a relatively high explosive coefficient has been produced from the ingredients above named without employing and incorporating other ingredients, and particularly other forms of carbon compounds.

The mixture is not only simply and cheaply manufactured, but the intimate mixing of the ingredients is safely and readily carried on in an ordinary mixing mill or barrel.

I claim:—

1. An explosive consisting of ammonium nitrate, a crystalline carbohydrate and a finely divided metallic substance which rap-

idly oxidizes with the evolution of intense heat in the proportions of 76 to 88 parts of ammonium nitrate, 6 to 12 parts of crystalline carbohydrate and 6 to 12 parts of finely divided metallic particles by weight, substantially as hereinbefore set forth.

2. An ammonium nitrate explosive com-

posed of ammonium nitrate 82.2 parts, sugar 9 parts and iron pyrites 8.8 parts, substantially as hereinbefore set forth.

JESSE B. BRONSTEIN.

Witnesses:

EDWARD E. OSBORN,
M. REGNER.