

UNITED STATES PATENT OFFICE.

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EXPLOSIVE.

No. 857,580.

Specification of Letters Patent.

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To all whom it may concern.

Be it known that I, FRANK EUSTACE WILKINS BOWEN, a subject of the King of Great Britain, residing at 6 Newcastle street, Farringdon street, London, England, engineer, have invented certain new and useful Improvements in Explosives, of which the following is a specification.

This invention relates to explosives suitable for use in shells and torpedoes, and for blasting purposes.

It is well known that the potential energy of an explosive, is dependent on the volume of gases generated, and on the temperature of combustion.

The purpose of this present invention is to produce an explosive of high potential energy, which at the same time possesses the qualities of stability, and safety, both in manufacture and use.

In order to produce this explosive I combine three different elements namely:—

1st. A combustible body which on decomposition gives rise to large volumes of gases. Preferably I use a hydrocarbon such as paraffin but by the term combustible there is to be also understood such substances as carbon, carbohydrates, or organic nitro-compounds, the latter for mining purposes where such great immunity from shock or concussion is not so material as in the case of shells and torpedoes, in which case I preferably employ the former substances.

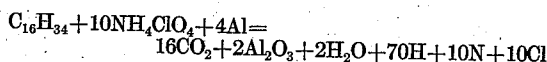
2nd. As to the second element I employ perchlorate of ammonia, which is rich in oxygen, stable, very slightly soluble, and non-hygroscopic, and its components are all gases, advantages which not many salts possess.

3rd. A metal whose oxid has a high heat of formation. Preferably I employ aluminum as the metal, but other metals, such as magnesium, whose oxids have a high heat of formation may also be employed. Although solids are produced on combustion the caloric value is so great that the gases produced by the two other elements are greatly expanded and the power of the explosive greatly enhanced.

I have found that the combination of the three elements as described above produces a very powerful and safe explosive with very desirable results, and is very stable.

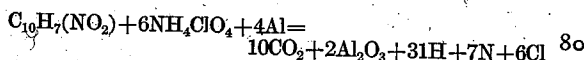
An explosive very suitable for shells consists in a mixture of:—77.85% perchlorate of ammonia. 7.2% aluminum. 14.95%

paraffin. This is an extremely powerful explosive as is shown by a comparison of the results obtained by the Trauzl test with it and with a like charge of a dynamite containing 75% of nitroglycerin. The dynamite gave a result of 360 cubic centimeters whereas the new explosive gave a result of 525 cubic centimeters. The result of the explosion is shown by the formula:



that is to say, that 1 kilogram of the explosive gives rise to no less than 868 liters of gas.

This explosive is scarcely sensitive enough for mining purposes. A suitable one is a mixture of: 71.47% perchlorate of ammonia. 10.99% aluminum. 17.54% nitronaphthalin. This explosive gives 460 cubic centimeters in a test under like conditions to the test above mentioned. The result of the explosion is shown by the formula:



that is to say, 1 kilogram of the explosive gives rise to 726 liters of gas. I do not confine myself to these proportions but may vary them in accordance with the results it may be desired to obtain, but the carbon should be present in such quantities as to combine, in conjunction with the aluminum, with the oxygen present, or at all events with the major portion of the oxygen the product CO_2 being mainly formed.

Stated in another way, there shall be present in the combination for every one atom of carbon in the combustible and for every two atoms of the metal, approximately, respectively, two and three atoms only of oxygen. Explosives made in accordance with this invention are exceedingly powerful and stable, and are characterized by great safety and freedom from explosion by concussion.

What I claim is:—

1. An explosive compound, containing a combustible, which on ignition gives rise to large volumes of gas, ammonium perchlorate, and a metal whose oxid has a high heat of formation, combined in such proportions that the amount of oxygen present is substantially sufficient to combine only with the metal and with the carbon to form the oxid of the metal and carbon dioxid.

2. An explosive compound, containing a combustible, which on ignition gives rise to

large volumes of gas; ammonium perchlorate and a metal whose oxid has a high heat of formation, combined in such proportions that for every one atom of carbon in the combustible and for every two atoms of the metal, there are approximately present, respectively, two and three atoms only of oxygen.

3. An explosive compound, containing paraffin, ammonium perchlorate and a metal whose oxid has a high heat of formation, combined in such proportions that for every one atom of carbon contained in the paraffin and for every two atoms of the metal, there

are approximately present, respectively, two and three atoms only of oxygen.

4. An explosive compound, containing paraffin, perchlorate of ammonia and aluminum combined in such proportions that for every one atom of carbon and for every two atoms of aluminum, there are approximately present, respectively, two and three atoms only of oxygen.

FRANK EUSTACE WILKINS BOWEN.

Witnesses:

ALFRED NUTTING,
FREDK. L. RAND.