UNITED STATES PATENT OFFICE.

JAMES F. O'BRIEN, OF CHICAGO, ILLINOIS.

EXPLOSIVE.

1,038,188. Specification of Letters Patent. Patented Sept. 10, 1912.

No Drawing. Application filed October 24, 1911. Serial No. 656,529.

To all whom it may concern:

Be it known that I, JAMES F. O'BRIEN, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Explosives, of which the following is a specification.

This invention relates to improvements in my alkaline chlorate carbo-hydrate explosive; and it relates particularly to the provision of carbo-hydrate in the form of molasses in that combination.

I have found, and have described and claimed in copending applications (explosive, filed September 5th, 1911, S. N. 647,474; explosive, filed September 20th, 1911, S. N. 650,373,) that a combination of ordinary sugar, sucrose, $C_{12}H_{22}O_{11}$, with potassium chlorate in the proportions about one to three will give the most efficient results for those particular ingredients. I have also found that other carbo-hydrates may be substituted for the sugar, the explosive result being somewhat similar. For instance, I may substitute starch for the sucrose, or any other carbo-hydrate of a composition generally resembling these.

By repeated experiment I have found that I am enabled to use molasses (common molasses of commerce either from a cane or beet basis) and obtain results which are strikingly efficient. Molasses, being a waste product of the manufacture of sugar, is comparatively very cheap; and, measured in point of cost, I am enabled to obtain greatly more explosive energy from a molasses explosive than from a sugar explosive. I have found also other advantages in using molasses, one of these being that the molasses is easily mixed with the other ingredients of the explosive, being already in a liquid state and not needing to be liquefied before mixing.

Average cane sugar molasses contains the following ingredients in about the following proportions: sucrose forty-two per cent.; invert sugar fifteen per cent.; ash (mineral noncombustible matters) three per cent.; water twenty-two per cent.; organic matter other than sugar fifteen per cent. Average beet sugar molasses is composed of the following ingredients in about the following proportions: sucrose fifty-three per cent.; ash eleven per cent.; water nineteen per cent.; organic matter seventeen per cent. In the average beet sugar molasses there is very little or no invert sugar.

I have found by repeated trials that the most efficient proportions of my molasses explosive (this being taken as an average, as different molasses will vary in their composition) are about one part molasses to two parts chlorate of an alkaline metal. For pure carbo-hydrate (for instance, sugar) and chlorate the proportions are about one to three. And it will be seen that these proportions, one to three, are maintained in my molasses explosive when it is considered that approximately one-third of the molasses is comprised in substances which do not enter into the carbo-hydrate and chlorate explosive reaction. In the preparation of the explosive all of the water is evaporated. This accounts for approximately twenty per cent. of the molasses used. There is from three to eleven per cent. ash from noncombustible matters, which of course do not enter into the reaction. These, together with whatever of the inorganic matter will not enter into the reaction, make up in the average case about thirty-three and one-third per cent. of the total weight of the molasses used. Thus, there is left sufficient of the molasses to make the final proportions of the available ingredients about one to three.

A typical composition of an explosive including this new combination is as follows: dark molasses one part; potassium chlorate two parts and finely divided brick dust (calcined clay) one part. I am enabled with this molasses explosive to use a larger proportion of brick dust than has heretofore been the case and still to obtain about the same explosive energy and efficiency. This fact, together with the relative cheapness of the molasses, enables me to produce this explosive at a figure much less than any other explosive of which I am aware. In common with my other chlorate carbo-hydrate explosive, this new explosive is of the smokeless variety, and it does not generate any poisonous gases by its combustion.

The brick dust in this compound acts in three distinct manners. It acts as a mechanical insulator for the powder, as a heat retainer, and as an absorbent of the explosive substances. As an absorbent of the explosive substances it aids in mechanically consolidating the explosive ingredients,

making the mass more conveniently and efficiently handled. As a heat retainer it has the property of keeping the heat of combustion confined to a small space and of thereby increasing the speed of combustion and expansion. In insulating the powder particles from surrounding materials and from themselves, the brick dust (or other equivalent material) greatly reduces the mechanical disintegration of the grains or individual masses and reduces the chances of accidental explosion.

I have found that the addition of the brick dust increases the explosive efficiency, at the same time decreasing cost. In this molasses explosive I may use a relatively large amount of brick dust and still attain an explosive efficiency greater than in other explosives. I have found that as much brick dust may be used as two thirds of the amount of chlorate. The brick dust (calcined clay) seems to re-act with the potassium and chlorin, its cilico-aluminous compounds forming compounds with those elements and preventing their combination to KCl.

In this explosive I may also add Prussian blue; but as a coloring matter this cyanogen compound is not needed, the molasses itself agreeably coloring the explosive. This acts as a combustion quickener and also acts, during the manufacturing process, to keep the mass of explosive moist and plastic for a longer period than otherwise, allowing the mass to be worked to better advantage.

Having described my invention, I claim:

1. An explosive, consisting of molasses, potassium chlorate, and finely divided burned clay, in the approximate proportions one to two to one.

2. An explosive, consisting of molasses, potassium chlorate, and burned clay.

3. An explosive, consisting of molasses, a chlorate of an alkali metal, and a substance containing aluminum silicate.

4. An explosive, consisting of molasses, potassium chlorate, and a silico-aluminous material.

5. An explosive, consisting of molasses, a chlorate of an alkali metal, and a silico-aluminous material.

6. An explosive, consisting of molasses and a chlorate of an alkali metal in approximate proportions one to two, and a silico-aluminous material.

In witness that I claim the foregoing I have hereunto subscribed my name this 18th day of October, 1911.

JAMES F. O'BRIEN.

Witnesses:
BESSIE MCMOEDIE,
JAMES T. BARKELEW.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."