UNITED STATES PATENT OFFICE.

GEORGE G. KING AND MILTON F. LINDSLEY, OF DEERFIELD TOWNSHIP, WARREN COUNTY, OHIO; SAID LINDSLEY ASSIGNOR TO SAID KING.

EXPLOSIVE COMPOUND.

1,012,368. Specification of Letters Patent. Patented Dec. 19, 1911.

No Drawing. Application filed August 10, 1911. Serial No. 643,360.

To all whom it may concern:

Be it known that we, GEORGE G. KING and MILTON F. LINDSLEY, citizens of the United States, residing in the township of Deerfield, in the county of Warren and State of Ohio, have invented an Improvement in Explosive Compounds, of which the following is a specification.

This invention relates to an explosive compound especially adapted for use in connection with ordnance and fire arms.

Our preferred formula for producing the invention consists of a combination of nitro-cellulose, nitro-starch, nitro-sugar, mirbane oil, asphalt, saltpeter, charcoal, and sulfur. These materials are preferably mixed in about the proportions of 12.50% nitro-cellulose, 6.25% nitro-sugar, 6. 25% nitro-starch, 4% mirbane oil, 1% asphalt, 52.50% saltpeter, 7% sulfur, and 10.50% charcoal.

In compounding our powder we preferably first charge a large iron cylinder loaded with iron balls, commonly called a ball mill, with a charge consisting of 50% wood fiber, preferably fiber made from poplar wood by the soda process, 25% granulated sugar, and 25% of potato starch. This charge is reduced in the mill to a very fine powder which is then thoroughly dried until all of the moisture is expelled after which it is nitrated by being fed slowly into a mixture of nitric and sulfuric acids, said acids being contained in a lead cylinder which is surrounded by a water jacket provided with a stirrer in the form of a screw which keeps the acid in a constant state of agitation, and so prevents firing. The office of the water jacket is to keep down the temperature of the re-action which should not be over 30° centigrade. The acids used in nitration should preferably be of sufficient strength to give the nitrated product a content of about 13% of nitrogen and should be mixed in the proportion of about 65% H_2SO_4 and 35% HNO_3. The nitrated mass is then thoroughly neutralized by continued washings, first in cold water baths and afterward in hot water baths, the cold water containing a small percentage of carbonate of soda (sal soda) and the hot water baths containing a small percentage of carbonate of calcium. After a thorough neutralization the nitro compound is de-hydrated and is then ready to mix with the other ingredients that comprise our compound in the following proportions: 25% of the nitro compound above described, 4% oil of mirbane, in which 1% of asphalt is dissolved before the oil of mirbane is introduced into the mass, 52.50% saltpeter, 7% sulfur, and 10½ charcoal. After these ingredients have been thoroughly mixed together by any suitable means they are placed under an edge runner, commonly called a wheel mill, which weighs about ten tons, and in this manner the ingredients are thoroughly mixed so that the resulting product becomes a more or less homogeneous mass. The charge per wheel is preferably about 400 pounds and the time of incorporation for each such charge about six hours. The wheel cake, so-called, as made by the before-described process, is then broken up and pressed into cakes about one and a half inches thick and about twenty-four inches square by means of a hydraulic press and plates, the preferred pressure required for this operation being about 6,000 pounds per square inch. The resulting cakes as they come from the press are then broken up and granulated in the same manner that ordinary black powder is made. After granulation the powder is dried at a temperature of about 120° Fahr.

The powder made by the above described process and from the ingredients in approximately the proportions mentioned is suitable for use in all kinds of guns and other weapons and shoots very clean, leaving scarcely any perceptible residue and making very little smoke. It is also very accurate in rifles of all calibers.

What we claim and desire to secure by Letters Patent of the United States is:

1. An explosive compound consisting of saltpeter, charcoal, a nitrated carbohydrate, sulfur, oil of mirbane and asphalt.

2. An explosive compound comprising the following ingredients: saltpeter, charcoal, nitro-cellulose, sulfur, nitro-starch, nitro-sugar, oil of mirbane, and asphalt.

3. An explosive compound comprising the following ingredients, in substantially the following proportions: saltpeter, 52.50%; charcoal, 10.50%; nitro-cellulose, 12.50%; sulfur, 7%; nitro-starch, 6.25%; nitro-sugar, 6.25%; oil of mirbane, 4%; asphalt 1%.

4. An explosive compound comprising the following ingredients incorporated into a

homogeneous mass in substantially the following proportions: saltpeter, 52.50%; charcoal, 10.50%; nitro-cellulose, 12.50%; sulfur, 7%; nitro-starch, 6.25%; nitro-sugar, 6.25%; oil of mirbane, 4%; asphalt 1%.

5. An explosive compound consisting of the following ingredients incorporated into a homogeneous mass in substantially the following proportions: saltpeter 52.50%; charcoal 10.50%; nitrated wood fiber, 12.50%; sulfur 7%; nitrated potato-meal, 6.25%; nitrated sugar 6.25%; oil of mirbane 4%, and asphalt 1%.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 1st day of Aug. 1911.

GEO. G. KING.
MILTON F. LINDSLEY.

Witnesses:
J. E. WITHAM,
C. E. GASKILL.