

UNITED STATES PATENT OFFICE.

GERSHOM M. PETERS, OF CINCINNATI, OHIO.

SAFETY-POWDER FOR BLASTING.

1,048,578.

Specification of Letters Patent.

Patented Dec. 31, 1912.

No Drawing.

Application filed March 12, 1910. Serial No. 548,900.

To all whom it may concern:

Be it known that I, GERSHOM M. PETERS, of Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Safety-Powders for Blasting Purposes, of which the following is a full, clear, and exact specification.

This invention relates to new and useful improvements in safety powders for blasting purposes.

The object of the invention is to furnish an explosive compound which shall have the desirable properties as an explosive, be safe to make, store, transport and fire, and which shall also readily detonate throughout its mass and thus avoid the necessity of introducing into the cartridge an extra detonating material for priming, or using an extra large and expensive detonating cap.

Nitrate of ammonia is common to most so-called safety powders, both in this country and abroad, and has been extensively used as an explosive for many years. It is not only powerful in its action, but explodes at a comparatively low temperature and gives off a large amount of hydrogen, which combining with oxygen in proper proportions produces water either condensed or in the form of vapor, thus dampening and extinguishing flame. But the great objection to nitrate of ammonia is its susceptibility to moisture, and when damp it loses its power and affects other ingredients with which it may be incorporated to their disadvantage. Its high hygroscopic properties also interfere with detonation, and it has been found that detonation must be prompt and complete in order to secure the requisites of safety. It can not burn as in the case of black powder.

To protect against moisture, it has been customary with those skilled in the art, to waterproof the granules of nitrate of ammonia with some sort of impervious coating, such as paraffin, resin, or collodion; but this practice greatly interferes with ignition or detonation.

In carrying out the present invention, it is desirable that a granular form of nitrate of ammonia be secured which is pure, dry and hard. It should then be dried out by heat before it is mixed with the other ingredients or packed in cartridges. In order to keep the improved powder dry it is found most desirable to rely for protection chiefly

on the form and character of the cartridge or case in which the powder is packed for transportation and use and it is preferred that a firm tube, thoroughly waterproofed, be used, the same having the ends hermetically sealed so that neither water nor air can get at the contents.

As a sensitizing agent in powders of this class, it has been heretofore proposed to use nitro-cellulose, as, for example, in Letters Patent of the United States, No. 953,798 granted April 5, 1910, in which I am a joint applicant with Milton F. Lindsley. But I find that under some conditions and in order to simplify the process of manufacture it is desirable to employ one of the carbohydrates other than cellulose, nitrated, instead of nitro-cellulose or nitrated wood fiber, the resulting explosive being somewhat quicker and more violent in its action. Any suitable form of carbohydrate, as starch or sugar, may be employed, but I prefer to employ what is commercially called "potato meal", as more granular and not so liable to be washed away or dissolved in the neutralizing process. This potato meal is thoroughly dried, after which acid is applied to it for the purpose of nitrating in the same manner that starch is usually nitrated. It is then washed in tanks fitted with stirrers until entirely neutral. Then it is allowed to settle and the water drained off, then it is placed in a dry-house and thoroughly dried. If, in the preparation of the nitrocarbohydrate a material be used such as starch or sugar, which may be readily dissolved away in the nitrating and washing process, it may be first pressed into cakes or strings and by passing through rolls after being dried, broken into fine grains, which being sifted to get fineness of grain may then be nitrated, the action of the acid being such as to incrust the granules and so prevent them from being broken and washed away.

In order to modify the effect of the nitrate of ammonia and the nitrocarbohydrate I add to these two other ingredients which have a very beneficial effect on the explosive without interfering with its explosive qualities, these ingredients being asphalt and mirbane oil. Asphalt is a mixture of hydrocarbons and the oil of mirbane is formed by the nitration of a coal tar product resembling in its properties the heavier part or oily base of benzin. The asphalt is prefer-

ably cut up or liquefied by the oil of mirbane and the two together are poured upon and worked into the other ingredients. The oil of mirbane tends to reduce the sensitivity of the compound while its solution with asphalt serves to prevent friction and heating of the ingredients to the point of danger during the mixing process. The asphalt also tends to slow down action in explosion and to add to heaving power, which are very desirable qualities in blasting powders.

The formula or proportions of ingredients are preferably substantially as follows: nitrate of ammonia, seventy-five per cent.; nitrated starch in the form of nitrated potato meal or dust, twenty per cent.; mirbane oil with asphalt held in solution in the proportions of approximately four parts of mirbane oil to one part of asphalt, five per cent.

Having described the nature of the invention and the manner of compounding the same, what I claim is:

1. A safety powder consisting of nitrate of ammonia, nitrated potato meal, and a nitrohydrocarbon solution of asphalt.

2. A safety powder consisting of a mixture of nitrate of ammonia, nitrated potato meal, mirbane oil and asphalt.

3. A safety powder consisting of nitrate of ammonia, nitrated potato meal, mirbane oil and asphalt, all incorporated into a homogeneous mass.

4. A safety powder consisting of the following ingredients incorporated into a homogeneous mass and in substantially the following proportions: nitrate of ammonia, seventy-five per cent. (75%); nitrated potato meal, twenty per cent. (20%); mirbane oil with asphalt held in solution, five per cent. (5%).

5. A safety powder consisting of the following ingredients incorporated into a homogeneous mass in substantially the following proportions: nitrate of ammonia, seventy-five per cent. (75%); nitrated potato meal, twenty per cent. (20%); and a solution of approximately four parts of mirbane oil and one part of asphalt, five per cent. (5%).

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 9th day of March A. D. 1910.

GERSHOM M. PETERS.

Witnesses:

A. M. BECKLEY,
E. F. GARRETT.