

UNITED STATES PATENT OFFICE.

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OHIO.

SAFETY-POWDER FOR BLASTING.

953,798.

Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that we, GERSHOM M. PETERS, of Cincinnati, in the county of Hamilton and State of Ohio, and MILTON F. LINDSLEY, of Kings Mills, county of Warren, and State of Ohio, have invented certain new and useful Improvements in Safety-Powder for Blasting, of which the following is a full, clear, and exact specification.

This invention relates to a new and useful improvement in safety powder 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, but which shall 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, expensive and dangerous 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, combined with oxygen in proper proportions, produces water either condensed or in the form of vapor, thus dampening down and extinguishing flame. But the great objection to nitrate of ammonia is its susceptibility to moisture, and when damp, it loses its power, and not only that, but it 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 cannot 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, we do not attempt any coating specifically of the nitrate of ammonia, but seek first of all to get a perfect article of this species which is pure, dry and hard in its granules in accordance with the improved methods of

manufacture; and then take the precaution to heat and dry out this substance before mixing it with other ingredients, or packing in cartridges. In order to keep our improved powder dry, we rely chiefly for protection on the form and character of the cartridge or case in which the composition is packed for transportation and use, which is a firm tube thoroughly waterproofed and having the ends hermetically sealed so that neither water nor air can get at the contents; but as this form of cartridge or case and method of packing are the subject of another application for patent now pending in the United States Patent Office, it is not necessary to here further describe the same. It will be understood, however, that complete protection is thus afforded to the powder, and ignition or detonation is not interfered with when it is desired for use.

We prefer nitrated wood fiber as a sensitizing agent, rather, for example, than nitro-glycerin or gun cotton (which are the most commonly used), both because it is less expensive and not so sudden and violent in its action, which are important qualifications when it comes to blasting coal and most work in quarries, where heaving the mass rather than shattering it is desired. Further, nitrated wood fiber is not incongruous with nitrate of ammonia, as would be the case with chlorate of potassium. Nor does it give off in the act of explosion poisonous or offensive gases, as in the case of picric acid or nitro-glycerin. Nitrated wood fiber is also available and effective in our composition because, inasmuch as our granules of nitrate of ammonia are not coated, they do not require so strong and violent a sensitizing agent to secure detonation, but co-act readily with nitrated wood fiber, which contains eleven per cent. of nitrogen. We are therefore able to use one of the lower grades of nitro compound, and this is advantageous, because the lower the grade, the better, for blasting purposes, provided it does the work effectively.

Nitrate of ammonia and a nitro compound are most frequently relied upon for explosive and detonating qualities in a safety powder; but we add to these two other ingredients designed to have a modifying effect without interfering with the explosive qualities, which supplemental elements are asphalt and mirbane oil in small per cents.

Asphalt is a mixture of hydro-carbons, and the oil of mirbane being formed by the nitration of a coal tar product resembling in its properties the heavier part or oily base of benzin, the two readily combine with the other substances as explosives. The asphalt is preferably cut up or liquefied by the oil of mirbane, to secure better distribution, and the two together are poured upon and worked into the other ingredients. This compound may add somewhat to the keeping qualities of the general mixture, but its primary object is to secure a cohesive and plastic condition, in order that the two ingredients in handling and transportation may not fall apart, and that the proportions and intimate contact of such ingredients with each other may not be disturbed. They also add to the density of the substance and assist in packing it more perfectly into cartridges. They likewise have a modifying effect on the explosive. The oil tends to reduce the sensitiveness of the nitro compound, while its solution with asphalt serves to prevent friction during the incorporation of ingredients, thus protecting the nitrated wood fiber from heating to the point of danger. It also tends to slow down action in explosion, and heave the mass, which are very desirable qualities in blasting.

In the process of making, the nitrate of ammonia is thoroughly dried and pulverized, the wood fiber, chemically pure, is reduced to an impalpable powder or dust, nitrated, neutralized and dried, according to the ordinary method, and the asphalt is dissolved in the oil of mirbane. All are then worked together and practically incorporated into one substance by means of light incorporating wheels turned on a bed plate after the manner of incorporating wheels in a black powder mill, or the incorporation may be sufficiently done by a mixing machine, such as a dough mixer. After its incorporation, the material is packed in various sized waterproof paper tubes and hermetically sealed.

The formula or proportions of ingredients are preferably substantially as follows:

50	Nitrate of ammonia	75%
	Nitrated wood fiber	20%
	Oil of mirbane	4%
	Asphalt	1%
55	Total	100%

The compound as thus formed is an explosive of superior qualities, which in part may be enumerated as follows: It is flameless and of low temperature in explosion, and therefore safe to use in mines. It will readily detonate through its mass by means of a primer of ordinary strength, and will

not explode except by detonation. It cannot be exploded by friction, blow, shock, or the application of fire, and is therefore safe to handle and transport. Its keeping properties, when made and packed as described, are of the best. It is stable and not affected by changes in atmosphere. It will not freeze, exude, or harden with age. It cannot be exploded by an electric current, even when short-circuited through it.

Having described the nature of the invention and the manner of compounding and transporting the same, what we claim and desire to secure by Letters Patent is:

1. A safety powder consisting of nitrate of ammonia, nitro-cellulose and a nitro-hydrocarbon solution of asphalt.
2. A safety powder consisting of nitrate of ammonia, nitrated wood fiber and a nitro-hydrocarbon solution of asphalt.
3. A safety powder consisting of nitrate of ammonia, nitro-cellulose and a mirbane oil solution of asphalt.
4. A safety powder consisting of a mixture of nitrate of ammonia, nitro-cellulose, mirbane oil, and asphalt.
5. A safety powder consisting of nitrate of ammonia, nitrated wood fiber, mirbane oil, and asphalt.
6. A safety powder consisting of nitrate of ammonia, nitrated wood fiber, mirbane oil and asphalt, all-incorporated into a homogeneous mass.
7. A safety powder comprising the following ingredients and in substantially the following proportions; nitrate of ammonia, seventy-five per cent. (75%), nitrated wood fiber, twenty per cent. (20%), mirbane oil, four per cent. (4%) and asphalt, one per cent. (1%).
8. A safety powder comprising the following ingredients incorporated into a homogeneous mass, and in substantially the following proportions: nitrate of ammonia, seventy five per cent. (75%), nitrated wood fiber, twenty per cent. (20%), mirbane oil, four per cent. (4%), and asphalt, one per cent. (1%).
9. A safety powder consisting of a substantially homogeneous mixture of nitrate of ammonia, finely divided nitro-cellulose, and a mirbane oil solution of asphalt.

In testimony whereof we have signed our names to this specification, in the presence of subscribing witnesses, on this 2d day of December A. D. 1908.

GERSHOM MOORE PETERS.
MILTON F. LINDSLEY.

Witnesses:

A. M. BEEKLEY,
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