

UNITED STATES PATENT OFFICE.

GERSHOM MOORE PETERS, OF CINCINNATI, AND MILTON FLETCHER LINDSLEY, OF KINGS MILLS, OHIO, ASSIGNORS TO THE KING POWDER COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

EXPLOSIVE.

1,011,238.

Specification of Letters Patent.

Patented Dec. 12, 1911.

No Drawing.

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To all whom it may concern:

Be it known that we, GERSHOM M. PETERS, residing at Cincinnati, county of Hamilton, and State of Ohio, and MILTON F. LINDSLEY, residing at Kings Mills, county of Warren, and State of Ohio, both citizens of the United States, have invented certain new and useful Improvements in Explosives, of which the following is a full, clear, and exact specification.

The invention relates to explosives for use in blasting and mining operations, designed to be of a strength greater than that of black powder. Black blasting powder has not the strength sufficient to do the best execution in some kinds of mining and excavation work. In mining operations, it has the effect to badly shatter the roof and to so pulverize the coal as to make much of it worthless owing to the fact that it will not detonate, though quick in ignition. Being comparatively slow in the development of its gas, it seems to keep up its action and hammer the coal to pieces after it is loosened from the wall. It also emits a great deal of offensive gas and smoke, which are objectionable. It also causes considerable concussion, often injuring the tops, sides and timbers of the entries. It is usually affected by moisture, and cannot be used where there is water. But the chief objection to black powder is the large amount of flame which it produces, make it exceedingly dangerous in mines troubled with damp or explosive gas.

Dynamite, the most generally known and used of high explosives, is objectionable in many respects. It freezes at forty-five degrees temperature, and when frozen is not explosive nor capable of being detonated, but it must be thawed out before using, which is a very troublesome operation, and also very dangerous. Many serious accidents have resulted from the use of dynamite on this account. In hot weather the nitroglycerin in the dynamite is liable to exude from the absorbent, which causes great risk and uncertainty in handling it. If dynamite be not properly made and properly neutralized, a condition which is very liable to result because of ignorant or careless employees, decomposition is likely to set in, a condition which has frequently been the cause of most frightful accidents. Then again, a sudden jolt or jar may set off the

best dynamite, often without any cause or explanation. In view of these liabilities to accident, transportation and storage of dynamite is becoming more and more a serious question. But aside from the risk attending the handling and use of it, dynamite is objectionable for many kinds of work, as for example, coal mining. The shock caused often damages the roof, sides and timbers. It is too violent and quick in its action, shattering the whole mass at the very instant of explosion. It is also found that the concussion caused is often so severe as to stir all the latent gases in the mines and, with the flame occasioned, causes secondary explosions of a serious nature, the coal being shattered to such an extent that it is almost pulverized and is thereby rendered unsalable. In mines and tunnel work the air becomes strongly impregnated with offensive and poisonous gases, making it impossible or extremely dangerous at times for men to work. In blasting in streets near cities or places near residences it also makes such a report and causes such a concussion of earth and air as not only to be very annoying but is often injurious to buildings located in the vicinity.

The object of our invention is to produce a powder capable of doing the most difficult work in mining and excavation, and yet obviate the objections enumerated in the use of black powder or dynamite, and at the same time to produce an explosive safe and convenient to handle and comparatively inexpensive to manufacture.

A further object of the invention is to make a detonating powder rather than a powder that explodes by burning, in order that it may be safer to handle and by its instant explosion have greater power, that is, be in effect what is commonly known as a high explosive.

The preferred formula which has been found to produce the best results consists of the following ingredients in substantially the proportions named: nitrate of ammonia, 30%; nitrate of soda, 30%; chlorate of potassium, 20%; wood meal, 10%; mirbane oil, 10%.

Nitrate of ammonia is employed not only because it is very rich in gas, but also because of the low temperature at which it explodes and because of the moisture of its gas. As a result, it is comparatively flame-

less and tends to smother out the flame which might be generated by the other ingredients. Nitrate of soda is also very rich in gas and is similar in its action to nitrate of ammonia, but is somewhat more stable and less expensive. Chlorate of potassium is somewhat less rich in gas than either of the above nitrates, but is more quick in its action and is sensitive to detonation, for which purpose chiefly it is added. Wood meal or its equivalent in cellulose fiber, is added to quicken and make more perfect the combustion. It also tends to lighten up the mass and render it more porous, which aids perfect and rapid penetration and combustion.

We use what is commonly known as mirbane oil, sometimes called nitrobenzene or nitrobenzol. We prefer a variety of mirbane oil which is well known commercially and which is made from the lower or heavier strata of benzene and hence is less volatile and has more body than those varieties made from the lighter or upper strata of benzene, and this product being of a more oily nature is therefore better adapted for the purposes herein described.

Mirbane oil united with chlorate of potassium becomes readily detonative. Mirbane oil is added also for the reason that it serves to reduce the other ingredients (which are dry and pulverized when introduced) to a plastic condition, which makes the composition convenient for handling and packing into cartridges. Being also an oily substance, it renders the other ingredients less hygroscopic. It also binds together the mass and keeps the other ingredients from sifting out or settling at the bottom according to their relative gravity. It also serves to so compact the mass of explosive as to render it practically impervious to moisture or air and by its addition the keeping qualities of the explosive are greatly improved.

In the preferred manner of practicing the invention, we first pulverize separately the nitrate of ammonia, the nitrate of soda, the chlorate of potassium and the cellulose fiber, dry them and then in substantially the proportions named, throw them together into a mixer, as, for example, a dough mixer or under mixing wheels. Over this mass, after

being mixed, the mirbane oil is poured in the proportion named. The mass is then thoroughly mixed until the ingredients are thoroughly distributed and the mass becomes homogeneous throughout.

When the powder is thus completed it is packed in paper cases or cartridges, carefully sealed and water proofed, after which it is ready for the market and for use. When used a primer is applied and fired as in the case of dynamite.

We claim:

1. An explosive compound composed of nitrate of ammonia, nitrate of soda, chlorate of potassium, mirbane oil and a carbonaceous material capable of being easily inflamed, all mixed together into a mass.

2. An explosive compound containing the following ingredients in substantially the proportions indicated: nitrate of ammonia, thirty per cent. (30%); chlorate of potassium, twenty per cent. (20%); nitrate of soda, thirty per cent. (30%); wood meal, ten per cent. (10%); and mirbane oil, ten per cent. (10%).

3. An explosive compound composed of a thorough intermixture of nitrate of ammonia, chlorate of potassium, nitrate of soda, mirbane oil and wood meal.

4. An explosive compound containing the following ingredients thoroughly intermixed and in substantially the proportions indicated: nitrate of ammonia, thirty per cent. (30%); nitrate of soda, thirty per cent. (30%); chlorate of potassium, twenty per cent. (20%); mirbane oil, ten per cent. (10%); cellulose, ten per cent. (10%).

5. An explosive compound consisting of a homogeneous mass of nitrate of ammonia, nitrate of soda, chlorate of potassium, cellulose, and mirbane oil.

In testimony whereof we have signed our names to this specification, in the presence of the subscribing witnesses, on this 3d day of June A. D. 1907.

GERSHOM MOORE PETERS.
MILTON FLETCHER LINDSLEY.

Witnesses:

A. M. BECKLEY,
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