UNITED STATES PATENT OFFICE.

REISSUED

ALFRED MONNIER, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN EXPLOSIVE COMPOUNDS.

Specification forming part of Letters Patent No. **218,762**, dated August 19, 1879; application filed April 24, 1879.

To all whom it may concern:

Be it known that I, ALFRED MONNIER, of the city and county of San Francisco, and State of California, have invented an Improvement in Explosive Compounds; and I hereby declare that the following is a full, clear, and exact description of the same.

My invention has reference to the manufacture of explosive compounds in which chlorate of potash is contained.

It consists, first, of a new method or process for preparing the chlorate of potash, so that it can be thoroughly and intimately incorporated into or intermixed with combustible substances, so as to produce a homogeneous compound without any danger whatever attending the manufacture; and, secondly, of a new combination of ingredients to be used in connection with chlorate of potash, by which I produce an explosive compound that will remain in a permanently soft condition, so that it will not explode spontaneously or by friction or percussion.

Among others, one method of manufacturing this class of explosives has been to grind separately, in a dry state, the chlorate of potash and other substances, such as charcoal, crystallized sugar, alkaline salts, or metallic oxides, and subsequently to mix them with oily, fatty, or resinous substances. This method is objectionable because unsafe and liable to explosion.

The object of my invention is to secure entire safety in the manufacture of this class of explosive compounds, and also to obtain a safe explosive mixture containing chlorate of potash as a base. This is effected, as hereinafter described, with the addition of water or other solvent of chlorate of potash.

To carry on my invention I proceed as follows: I dissolve seventy-one parts of chlorate of potash in about two hundred and fifty parts of water in a circular copper pan or vessel having double bottom. Steam being introduced between these two bottoms, the temperature of the water in the pan will rise and the dissolution of the chlorate soon take place. When the chlorate is dissolved I add sixteen parts of sugar and six parts of ground charcoal. Steam is kept on, so as to evaporate the water.

During the evaporation the solution contained in the pan is kept in a state of constant agitation by wooden or copper rakes or stirrers fixed to cross-arms. These arms are fixed to a central shaft hung above the pan. Motion is given to the shaft by a pulley and belt. The agitation during the evaporation of the water causes the chlorate to crystallize in minute thin flat crystals. When most of the water is evaporated the mixture is then placed in a burr-mill, enough water remaining to allow the compound to pass through the mill. The presence of a sufficient quantity of water in the grinding and mixing of chlorate of potash, alone or with other substances, prevents any danger of ignition and makes the operation harmless.

The object and result of the grinding are to reduce the minute crystals of chlorate, as well as the charcoal, to an impalpable degree of fineness and thoroughly incorporate the mixture. The ground and semi-fluid mixture is then put in a shallow circular pan similar to the one above described, having a double bottom, into which steam is introduced; but instead of arms and rakes, the central shaft gives motion to four copper conical rollers running loose on the shaft.

Following said rollers are copper blades distanced to clean the rollers of any mixture which may adhere to them, and also to turn over and arrange the mixture for the following roller. When the substance is nearly dry I add seven parts of coal-tar, and keep up the steam, as well as the motion of the rollers, to produce a perfect incorporation of the tar with the other ingredients. After three hours, more or less, of such treatment, and when the mixture forms lumps when pressed in the hand without adhering to it, it is removed and placed on shelves in a room heated to about 180° Fahrenheit for a day or two. It is then removed, and, when cold, is ready for use.

Wood-tar, or a mixture of coal-tar and asphaltum or other tarry matter, could be substituted for coal-tar. The proportion of the substances above described or the order in which they are introduced in the pan, may be altered.

I do not confine myself to the manner of applying heat, nor the form of apparatus to carry on my invention.

The advantage of my invention is, that an

entirely safe and powerful explosive compound can be made from chlorate of potash, which is free from any danger in its manufacture or in its transportation and use. The thorough grinding and intermixing of the materials, as above described, perfectly isolates the minute particles of chlorate of potash from each other, and thoroughly disseminates them through the tarry matter, making a perfect mixture that will remain permanently soft and pliable, and giving a safe compound entirely free from any danger of spontaneous combustion or of exploding prematurely, or by friction or percussion, exploding only when fired under high pressure, and one that, when fired without pressure, burns only and does not explode.

The explosive compound is obtained at less than half the cost, having at the same time more than double the explosive force, of the nitro-glycerine compound now in use, and having the still further advantage of being free from injurious odors and producing comparatively little smoke—all advantages fully appreciated by miners.

I am aware that molasses and other non-combustible and non-inflammable liquid substances have been added to compounds containing chlorate of potash in order to form a non-drying compound. This, however, makes an inferior explosive, as the non-combustibility of the added liquid retards combustion. My invention, however, supplies the same result with a combustible non-drier, which adds effect to the explosive character of the compound.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The herein-described process or method of making an explosive compound containing chlorate of potash as a base, consisting in dissolving the chlorate of potash in water; then adding to the dissolved potash a carbo-hydrate and ground charcoal, which are continuously steamed and agitated; thirdly, grinding and reducing the same; and, finally, adding coal-tar and steaming, agitating, and rolling the whole mass, as set forth.

2. An explosive compound consisting of chlorate of potash, sugar, ground charcoal, and coal-tar, in the proportions substantially as set forth.

In witness whereof I have hereunto set my hand and seal.

ALFRED MONNIER. [L. S.]

Witnesses:

W. FLOYD DUCKETT,

W. F. CLARK.