

# UNITED STATES PATENT OFFICE.

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## EXPLOSIVE COMPOUND.

SPECIFICATION forming part of Letters Patent No. 478,819, dated July 12, 1892.

Application filed April 1, 1891. Serial No. 427,388. (No specimens.) Patented in Canada April 21, 1892, No. 38,779.

*To all whom it may concern:*

Be it known that I, ADDISON CRITTENDEN RAND, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Explosive Compounds, (for which Letters Patent have been granted to me in Canada, No. 38,779, dated April 21, 1892,) of which the following is a full, clear, and exact description.

My invention relates to that class of explosive compounds which are composed of a solid ingredient, usually in a finely-powdered state, and a liquid ingredient, the said ingredients being in and of themselves non-explosive and being combined to constitute the explosive compound by the incorporation of the fluid with the solid by the absorption by the pulverulent mass of the latter of the former. Chlorate of potash or its equivalent—such as perchlorate or permanganate of potash—has been generally employed as the solid ingredient in explosive compounds of this class, and a fluid hydrocarbon—such as nitro-benzol or the heavy oil of coal-tar, commonly called “dead-oil”—has been used as the liquid ingredient.

My invention consists in an explosive compound composed of chlorate of potash or its equivalent oxidant in a finely-powdered state and a mineral substance of the character hereinafter set forth in the form of coarse granular particles, the said powdered chlorate of potash and said mineral grains being mechanically mixed together in about the proportions hereinafter stated to constitute the solid ingredient of the explosive compound, and a fluid hydrocarbon—such as nitro-benzol—constituting the liquid ingredient of the explosive compound, the explosive compound being formed by the incorporation with the intermingled powdered chlorate of potash and mineral grains of the fluid hydrocarbon, which is effected by causing the mass of said solid ingredients to absorb said fluid ingredient. In selecting a mineral substance to constitute the mineral grains in the said mixture thereof with the chlorate of potash to form the solid ingredient of the aforesaid compound the substance chosen should be hard, dense, and to a high degree non-porous, and it may be a mineral which is of itself inexplosive and

wholly inert in the explosive compound; or, which is preferable, it may be a mineral which is to some degree an oxidant—as, for example, manganese peroxide. This material is obtainable from the hard ores of manganese, such as pyrolusite. The manganese should be reduced by crushing or a degree of pulverization to the form of coarse grains or particles. It will thus form granular particles, which are exceedingly hard, dense, and practically non-porous and which are irregularly angular in contour, which conditions or characteristics are desirable in the mineral grains employed with the powdered chlorate of potash in constituting the solid ingredient of the explosive compound for the attainment of the best results in carrying out this invention.

In fabricating the explosive compound in accordance with this invention the employment in mixture of equal parts, by weight, of powdered chlorate of potash and manganese peroxide in coarse grains and the incorporation therewith by the absorption by the mass of this mixture of fifteen per cent., by weight, of nitro-benzol will produce an explosive compound which will be serviceable and effective in all usual-blasting operations where the use of a high explosive is required. The proportion of manganese peroxide in the described mixture may be somewhat increased, say, to about sixty per cent. of the mixture thereof with the chlorate of potash, or decreased, as, say, to about forty per cent. of said mixture, with the effect of diminishing or augmenting, respectively, the dynamic force of a serviceable high explosive. When a mineral which is inexplosive and inert in the compound is used in the mixture with the chlorate of potash to form the solid ingredient, an effective explosive compound will be constituted by employing about forty per cent., by weight, of said mineral grains to about sixty per cent. of the powdered chlorate of potash and causing to be absorbed by the mass of this mixture about fifteen per cent., by weight, of a fluid hydrocarbon, such as nitro-benzol. The strength or dynamic force of this compound may be altered or graded by variations somewhat from the said proportions of the said mineral grains in the said mixture forming the solid ingredient.



In an explosive of the class stated, in which the final compound is prepared for use by the incorporation with the solid ingredient of a fluid ingredient—such as nitro-benzol—by the absorption of the latter by the mass of the former, the presence of the coarse hard non-porous mineral grains in the mixture with the powdered chlorate of potash constituting the solid ingredient, separates or divides the fine particles of powdered chlorate of potash into small groups or masses in and throughout the porous cartridge case or shell in which the solid ingredient is usually placed preparatory to saturation with the fluid hydrocarbon, and the said mineral grains thus dispersed throughout the powdered chlorate of potash in said cartridge-case form by their irregular angular and hard surfaces interstices or quasi-channels throughout the entire chlorate of potash.

The incorporation of the fluid ingredient with the solid ingredient in the porous cartridge-case by the absorption of the former with the mass of the latter and the desired uniform distribution of said fluid throughout the mass of the solid ingredient are greatly facilitated and promoted both in the period of time required therefor and the completeness of the result attained when the described mineral grains are present in the solid ingredient over what occurs when the solid ingredient, the mass of which is to absorb the fluid ingredient, is wholly composed of a finely-powdered material, such as pulverized chlorate of potash. The fluid hydrocarbon is quickly brought into intimate mixture with the entire quantity of chlorate of potash throughout the cartridge, and hence the most favorable conditions are established for the complete and effective explosion of the cartridge upon ignition of its contained compound. The "waterproofing" of the cartridge by the fluid hydrocarbon is also made more certain and effective by this uniform distribution of the hydrocarbon throughout the said mass. Owing to the non-porous and non-deliquescent character of the mineral grains in the composition, the foregoing-described conditions are preserved in the cartridge after its saturation with the fluid hydrocarbon.

Upon the ignition of the explosive cartridge, which may be effected by a detonator in the usual manner, the quick traverse of the heat thereby generated throughout the entire mass of the cartridge is facilitated by the interstices or channels in the body of the combined powdered chlorate of potash and hydrocarbon formed, as hereinbefore set forth, by the de-

scribed mineral grains, so that quickness of explosion of the entire mass of the compound in the cartridge is attained; and it is believed that the said coarse hard mineral grains in and of themselves assist in promoting the quickness and certainty of the explosion of the said united ingredients by the heat generated by the exceedingly-rapid friction of the atomic particles into which said coarse grains are instantly reduced by the explosion against each other and against the particles of the powdered chlorate of potash or some portion thereof at the initial moment of the explosion. When manganese peroxide is employed to form the said mineral grains, the disintegration of said grains into atomic particles by the explosion will not only promote the instantaneousness of the explosion of the entire mass by the attrition of said particles as above set forth, but will also co-operate as an active agent in the generation of gas by the yielding up of oxygen from the minute particles under the action of the developed heat.

The herein-described compound may be exploded under conditions of imperfect confinement—as, for example, in soft, loose, or rotten rock—and will be effective under all circumstances in general blasting operations where the use of a high explosive is required.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An explosive compound composed of an oxidant, as chlorate of potash, in a powdered state, and a hard dense non-porous mineral substance in the form of coarse grains, said mineral grains being distributed in about the proportions named throughout the mass of the powdered oxidant, and a fluid hydrocarbon, as nitro-benzol, incorporated in about the proportions named in the mixture of said powdered oxidant and said mineral grains, substantially as and for the purpose specified.
2. An explosive compound composed of an oxidant, as chlorate of potash, in a powdered state, and manganese peroxide in the form of coarse grains in about the proportions named, said grains being distributed throughout the mass of the powdered oxidant, and a fluid hydrocarbon, as nitro-benzol, in about the proportions named, incorporated in the mixture of said powdered oxidant and said grains, substantially as and for the purpose specified.

ADDISON CRITTENDEN RAND.

Witnesses:

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