

UNITED STATES PATENT OFFICE.

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DETONATING COMPOSITION.

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Specification of Letters Patent.

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No Drawing.

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To all whom it may concern:

Be it known that I, ERNEST GOODWIN, cartridge chemist, a subject of the King of Great Britain, residing at Stamford Hill, in the county of London, England, have invented certain new and useful Improvements in Detonating Compositions for Use in Rim-Fire Cartridges, Percussion-Caps, Detonators, and the Like, and of which the following is a specification.

The ordinary detonating compositions, which consist of various mixtures of fulminate of mercury, potassium chlorate, and stibnite, with or without powdered glass, sulfur, meal powder, etc., are objectionable in several respects. Thus on firing a rifle (in particular any small rim-fire rifle of .22 inch caliber, to which this invention is specially applicable) and then opening the breech to extract the fired cartridge case and to introduce another cartridge, the shooter is frequently seriously inconvenienced by the offensive fumes which have been formed by the combustion of the explosive contents of the cartridge, such contents of the cartridge as is well known being composed of a small charge of detonating composition which was contained in a percussion cap of the cartridge, or in the rim of the rim-fire cartridge, and the larger charge of propellant powder which was ignited by the flames from the explosion of the detonating composition, with or without the assistance of a layer of black or smokeless powder located between the detonating composition and the propellant powder. Besides this, the residues formed by the combustion of the explosive contents (as usually composed) of a series of cartridges, acting in conjunction with atmospheric moisture, produce a very considerable rusting effect due to the chemical action upon the interior surface of the rifle barrel. Moreover in cartridges as at present constructed, it is commonly necessary to employ a layer of black or smokeless powder to provide a sufficient volume of suitable flame to ignite the propellant powder in the desired manner without casualties, such for instance as bursts in the rims of the cartridge case; and detonating compositions of ordinary kinds ignite under great pressure and cannot therefore be strongly compressed, and thereby are difficult and dangerous in manufacture, and are not sufficiently sen-

sitive to the striker of the rifle; also but a small quantity of ordinary detonating composition can be located in a rim of a rim-fire cartridge because bursts of the rim and head are to be feared by reason of the violence of detonation of such compositions. Further, ordinary detonating compositions explode with a loud report.

In the manufacture of detonating compositions it has been proposed to employ in one instance a mixture of fulminate of mercury, gun cotton and potassium chlorate; in another instance, a plastic explosive consisting of fulminate of mercury incorporated into a paste of nitroglycerin and a cellulose nitrate (the mixture being subsequently deprived of its remaining solvent) with or without the addition of a deterring agent such as nitrobenzene or a nitronaphthalene; and in a third instance it has been proposed to replace the whole or part of the fulminate of mercury by disruptive nitro-compounds such as picric acid, mono- and tri-nitrotoluenes, tri-nitrocresol and its salts, the nitrated naphthalenes, and similar substances.

Now the object of the present invention is to provide a detonating composition in which the before stated disadvantages and difficulties are wholly or in great part overcome and obviated by the employment of detonating compositions composed—according to this invention—as hereafter described.

The composition or compositions according to this invention differ from those of the usual kinds in the following points:—

1. In the replacement of the whole or part of the potassium chlorate commonly employed in the usual detonating compounds by a mixture of trinitrotoluene and a peroxid, preferably that of barium. I preferably employ trinitrotoluene which melts at 81° C. as being best suited to the composition, but instead, or as a substitute therefor, I might employ, in carrying out this invention, trinitrotoluenes of lower melting point, or other nitrotoluenes, cellulose nitrates, picric acid, nitrocresols, nitroxylenes, nitronaphthalenes or similar known substitutes for trinitrotoluene although I consider trinitrotoluene as aforesaid to be best suited for the purpose. It is not proposed according to this invention to replace the fulminate of mercury, either wholly or in part,

by the barium peroxid and trinitrotoluene, but simply to replace the whole or part of the potassium chlorate. The compositions according to this invention may in fact contain a larger percentage of fulminate of mercury than can be used in the kinds which contain potassium chlorate as commonly used.

2. In the use of a mud of fulminate of mercury, in the aforesaid composition according to this invention, prepared by precipitation from a solution of one of its double salts, such as those of potassium cyanid or of pyridin, by which means is obtained a mud of small crystals of uniform size.

Methods of precipitation of fulminate of mercury are already known and therefore do not require description in this specification.

In order that the invention may be more fully understood, I will give merely by way of example a more detailed manufacture of the detonating composition according to this invention.

3 parts of wet fulminate of mercury in its precipitated state containing about 22% of water (or the equivalent weight of dry fulminate of mercury, namely about 2.4 parts) are thoroughly incorporated with two parts of a powdered mixture of 16 parts of barium peroxid, 7 parts of stibnite and $4\frac{1}{2}$ parts of trinitrotoluene. A charge of about 0.9 grain of this composition is introduced into the rim of a .22 rim-fire cartridge case, dried, and submitted to a strong pressure in order to raise to the desired degree the sensitiveness of the cartridge to the rifle-striker. The charge of propellant powder is then introduced and the cartridge loaded in the usual manner.

The compositions according to this invention (which have been proved to be highly stable) may also be made by mixing the dry constituents by any known process; and the percentage of the various parts can be altered to suit the kind of ignition required.

By the employment of denotating compositions according to this invention and such as have been specified, a smaller quantity of less offensive fumes is formed on firing, so that especially on a closed range the shooter is considerably benefited.

The rusting effect due to the action on the interior surface of the rifle barrel of the residues formed by the combustion of the explosive contents acting in conjunction with the atmospheric moisture as before stated, is very considerably decreased. Further, the necessity for the use of the intermediate layer of black or smokeless powder in the cartridge is removed.

The detonating composition according to the present invention, whether in a loose dry powder or in a wet paste, is much less sensitive to friction or percussion than those of the ordinary kinds, and can be safely subjected to high pressure, to cause the composition to become tightly caked, and thereby allows of the production of a cartridge more sensitive to the rifle-striker than can be produced by the use of any detonating composition of the ordinary known kind, and consequently the improved compositions are safer for manufacturing uses, and yet enable a cartridge to be produced which is more easily fired by a weak rifle-striker. The said detonating composition described can also be used in larger quantities without damage on firing to the rim and head of the cartridge, because the total and local violence of the gas pressure produced in the rim of the cartridge case is considerably decreased and the combustion of the propellant powder is moreover facilitated by the greater body of flame which is given off in the explosion of the improved composition. The noise of the explosion of the cartridge in which the improved composition is employed is decreased, the said composition igniting with a faint report and a large flame.

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

1. The herein-described detonating composition comprising a fulminate of mercury, a peroxid and trinitrotoluene.
2. The herein-described detonating composition comprising a fulminate of mercury, barium peroxid and a trinitrotoluene.
3. The herein-described detonating composition comprising finely divided fulminate of mercury, a peroxid and trinitrotoluene.
4. The herein-described detonating composition comprising finely divided fulminate of mercury, barium peroxid and trinitrotoluene.
5. The herein-described detonating composition comprising a fulminate of mercury, barium peroxid, stibnite and trinitrotoluene.
6. The herein-described detonating composition comprising about 2.4 parts of fulminate of mercury thoroughly incorporated with about 2 parts of a powdered mixture of 16 parts of barium peroxid about 7 parts of stibnite and about $4\frac{1}{2}$ parts of trinitrotoluene.

In witness whereof I have hereunto set my hand in the presence of two witnesses.

ERNEST GOODWIN.

Witnesses:

THOMAS WILLIAM ROGERS.
WILLIAM A. MARSHALL.