

# UNITED STATES PATENT OFFICE.

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## EXPLOSIVE COMPOUND.

1,301,646.

Specification of Letters Patent.

Patented Apr. 22, 1919.

No Drawing. Continuation in part of application Serial No. 774,267, filed June 17, 1913. This application filed October 13, 1917. Serial No. 196,555.

To all whom it may concern:

Be it known that we, FRANK R. BURROWS and JOSEPH G. BURROWS, subjects of the King of Great Britain, residing at Port Arthur, in the Province of Ontario and Dominion of Canada, have invented new and useful Improvements in Explosive Compounds, of which the following is a specification.

10 This invention relates to explosive compounds, and its object is to provide an explosive compound of great power and destructive strength, and which is at the same time safe and cheap and susceptible of being easily and safely manufactured.

15 A further object of the invention is to provide an explosive compound which will not freeze and is absolutely safe from explosion except by detonation, which explodes without giving off injurious fuses, which allows sprung holes to be charged without the necessity of cooling off, and which possesses other material advantages, hereinafter fully described.

25 In carrying our invention into practice, we provided an explosive compound consisting essentially of the following ingredients or their substantial equivalents, to wit:

30	Ammonium perchlorate.....	6 parts
	Potassium nitrate.....	56 parts
	Aluminium (30 mesh "water-cooled") .....	18 parts
	Alpha-trinitrotoluene, C <sub>6</sub> H <sub>2</sub> (NO <sub>2</sub> ) <sub>3</sub> CH <sub>3</sub> .....	18 parts
35	Pure paraffin wax.....	2 parts
	Total .....	100 parts

40 The ingredients are mixed in an ordinary incorporating mill, the potassium nitrate being first introduced and the mill kept in action for a period of about 30 minutes to effect its reduction to the desired degree of fineness, after which the alpha-trinitrotoluene and ammonium perchlorate are introduced, the mass ground and agitated for a further period of 20 minutes, and the aluminium and wax then successively introduced and the mixture agitated, ground and stirred for like periods at each successive stage of introduction. From the mill the compound thus prepared is then passed to a sifter consisting of a revoluble screen drum covered by a wire mesh cloth (e. g. 55 about 16 meshes per inch), through which

the powder discharges as the drum revolves. A number of brass or other hard balls are placed in this drum to break up all hard lumps and to disintegrate all the material to the desired degree. The powder is then filled into paper cartridge cases, preferably by a filling machine, and the cases folded and dipped in melted paraffin. The explosive in the form of cartridges is then ready for use.

60 This explosive compound possesses great explosive power, is non-freezing, and consequently the dangers experienced in the operations of thawing out other explosives are avoided, and it is also absolutely safe from explosion by attrition or friction, or by fire, or by blows or concussions from tools or the like. It does not give off any injurious gases, as substantially all injurious gases are consumed in the explosive action. The explosive may be manufactured with absolute safety at all times, may be used in either wet or dry holes, and will explode only by detonation, using a detonator of not less than No. 6 strength. It may be simply and cheaply manufactured, allows holes to be charged and mis-fires to be treated without risk, and since it is not exploded by heat, a sprung hole may be charged thereby without danger and without the necessity of waiting until the bore is cooled, thus obviating the loss of time and danger incurred in the use of ordinary explosives.

65 The alpha-trinitrotoluene, C<sub>6</sub>H<sub>2</sub>(NO<sub>2</sub>)<sub>3</sub> CH<sub>3</sub>, (2-4-6-nitro-1-methyl benzene) employed in our composition, is a product of the nitration of liquid toluol, and has been found superior in every respect to liquid nitrotoluol or to any of the other isomers of trinitrotoluene in a composition of this character, as it has certain properties which the liquid toluol or the other isomers do not possess.

70 The explosive prepared as described may be heated on a hot plate sufficiently to melt out the alpha-trinitrotoluene, and even if the plate is red-hot, the latter will burn slowly but the mixture will not explode. No other variety of trinitrotoluene will operate in this manner.

75 The water-cooled process aluminium employed in this improved explosive compound is prepared by pouring the molten material on to a rapidly revolving wheel which dashes it in the form of spray into cold

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water. This process produces large particles or granules and gives the cooled particles or granules very sharp points or edges which render the material susceptible to rapid ignition and combustion. This material is then ground, or is ground during operation, to pass through a screen having about 30 meshes per linear inch, the particles of which are porous and hence in a highly reactive state. Aluminium prepared in any other way does not give, in explosive work, the complete satisfaction and advantage afforded by the aluminium as above stated. The form in which the aluminium is used in this compound is of material importance, and when used in connection with the other ingredients set forth, provides a compound which possesses the desirable advantage before stated.

The ammonium perchlorate is a very important ingredient of the present composition, in that it forms a perfect combination between the aluminium and the alpha-trinitrotoluene, increasing the intensity of explosion to a great extent. While the compound when exploded gives off a quantity of smoke, this is of a harmless nature, the intensity of the explosion causing the consumption of all harmful gases. The compound has a very desirable and unique ripping action in blasting large masses of rock,

and in the tests made, is found to be of greater disruptive strength than any ordinary explosive.

The present application is in part a continuation of matter disclosed in the file of our copending application 774,267, filed June 17, 1913.

What we claim is:—

1. An explosive compound including ammonium perchlorate, potassium nitrate, 30-mesh porous, jagged-surfaced aluminium granules, prepared as set forth, and alpha-trinitrotoluene.

2. An explosive compound including ammonium perchlorate, potassium nitrate, porous, jagged-surfaced aluminium particles, prepared as set forth, alpha-trinitrotoluene and paraffin.

3. An explosive compound consisting substantially of 6 parts of ammonium perchlorate, 56 parts of potassium nitrate, 18 parts of 30-mesh porous, jagged-surfaced aluminium particles, prepared as set forth, 18 parts of alpha-trinitrotoluene, and 2 parts of paraffin wax, all reduced to a fine powder and thoroughly mixed.

In testimony whereof we affix our signatures.

FRANK R. BURROWS.  
JOSEPH C. BURROWS.