

UNITED STATES PATENT OFFICE.

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EXPLOSIVE AND PROCESS OF MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 751,751, dated February 9, 1904.

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To all whom it may concern:

Be it known that I, BOAZ D. PIKE, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Explosives and Processes of Manufacturing the Same, of which the following is a specification.

All explosives that contain metallic salts—such, for example, as the various explosive mixtures containing chlorate of potash—are more or less dangerous to handle and are also liable to deteriorate in strength and other qualities after manufacture. This is especially the case when explosives of such class are kept in a damp place or are exposed to moisture or extremes of temperature, and for preventing the action or effect of such agents on the explosive various substances have been utilized and employed as a covering or coating to protect the granules or particles, both by preventing physical contact of the particles of the metallic salts among themselves and with the other ingredients in the mass and in addition to such isolating qualities giving the metallic salts the power or property of resisting or repelling moisture, for in proportion as the metallic salts are rendered incapable of absorbing moisture and are kept from actual physical contact in the mass the mixture will increase in value and strength as an explosive.

My present improvement pertains chiefly to the application, combination, and use in and with explosives of the class or description before mentioned of the substance or produce known as "china-nut oil" as an agent or medium to cover and protect the granules from moisture and atmospheric influences, and also to isolate the particles from one another to the extent of preventing physical contact.

It relates also to the production of an explosive possessing in a high degree the qualities of safety during its manufacture, handling, and transportation, of retaining its strength and explosive properties under exposure to extremes of temperature and changes of climate, and being unaffected by dampness or moisture.

The invention is based on the discovery I have made that the substance or product known as "china-nut oil" is peculiarly adapt-

ed as a protecting medium for the particles in these compounds or mixtures containing metallic salts. When properly incorporated in explosive mixtures of this class, it forms a protective coating that is permanent in its qualities and properties, undergoing no change or deterioration by exposure to changes of temperature or climate or lapse of time between the manufacture of the explosive and its use. It is adhesive, elastic, and coherent to a high degree. It is also rich in carbon in a most advantageous form, being itself a hydrocarbon. It is also found to simplify the process of manufacturing explosives of this class or description and to materially reduce their cost. This substance (china-nut oil) is found to combine or mix readily with other hydrocarbons in a liquid state, and particularly with petroleum and any of the distillates of petroleum, thus enabling the proportions of metallic salts, carbon, and sulfur in explosives of this class to be varied as may be found necessary to regulate the sensitiveness of the mixture to detonation and explosion for specific purposes.

My invention therefore consists, essentially, in the application, combination, or mixture of the substance china-nut oil in and with explosives containing metallic salts and in the production and manufacture of a high-grade explosive composed of a metallic salt, carbon, sulfur, and china-nut oil, as hereinafter fully described, and pointed out in the claims at the end of this specification.

In applying and carrying out my said improvement in the manufacture of black gunpowder or black blasting-powder, which are generally composed of nitrate of potash or nitrate of soda, sulfur, and charcoal, I add the china-nut oil in about the proportions of eight per cent., by weight, of the other ingredients. A powder of this grade or quality will consist of the above-named ingredients in about the following proportions: nitrate of potash, (or nitrate of soda,) seventy-five parts; sulfur, ten parts; wood-charcoal, fifteen parts. After the substances are finely powdered and dried the china-nut oil is added to the nitrate and thoroughly incorporated until every particle is covered with the oil. The

charcoal and nitrate are then mixed, and finally the sulfur is added and all well mixed together. The product is then granulated in the usual manner by passing it through sieves, or it can
5 be pressed into blocks of any desired form.

The manufacture of this class of powder need not be confined to the use of wood-charcoal for the solid carbon element, for stone-coal or other forms of carbonaceous material
10 in a solid form can be substituted for the wood-charcoal when it is desired to change the specific gravity of the explosive or for the further object of varying its intensity.

The china-nut oil being very rich in carbon
15 allows the proportion of charcoal to be reduced, and in practice it has been found that five per cent. of charcoal can be used with good results with the china-nut oil in the production of an explosive according to the foregoing formula.
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Gunpowder or blasting-powder composed of the above-named ingredients with the addition of the china-nut oil possesses several advantages over the ordinary mixtures or com-
25 pounds containing no china-nut oil. They are not affected by exposure to moist atmospheres, and they will not deteriorate rapidly when used for blasting in damp or wet ground. They are also much slower in action, thereby re-
30 ducing the breech pressure in the case of gunpowder and increasing the efficiency of the blasting-powder in working in coal or soft rock.

In the production of an explosive contain-
35 ing chlorate of potash the proportions of china-nut oil can be varied to advantage. A good formula for an explosive of this character consists of chlorate of potash, seventy-five parts; sulfur, ten parts; wood-pulp, five
40 parts; china-nut oil, ten parts, by weight. The chlorate of potash should be reduced to a very fine powder and dried before the china-nut oil is added, and after the oil is thoroughly mixed and incorporated, so as to cover every
45 particle of the chlorate, the sulfur and the wood-pulp should be separately and thoroughly mixed with the covered particles of the chlorate. The mixture is now ready for granulating by passing it through sieves, or it is
50 pressed into blocks or loaded into paper or metallic shells. This chlorate-of-potash powder is not affected by atmospheric moisture, and it can be stored for an indefinite period without deteriorating in strength. It is a
55 powerful explosive well adapted for use in blasting hard rock.

Another strong powder is produced by mixing nitrate of soda or nitrate of potash with chlorate of potash in the following propor-
60 tions: chlorate of potash, forty-five parts; nitrate of soda, (or nitrate of potash,) thirty parts; sulfur, ten parts; wood-charcoal, five parts; china-nut oil, ten parts. These ingredients are mixed in the manner above de-
65 scribed, the chlorate of potash and the china-

nut oil being first combined and afterward the remaining ingredients mixed and incorporated with the chlorate in the order named.

It will be obvious to those who are skilled in the production of explosives from chlorate of
70 potash and other similar oxygen-bearing substances that the proportions of the chlorate of potash and nitrate of soda or nitrate of potash can be varied to produce powders of different degrees of strength and sensitiveness,
75 and I give the foregoing formula only as an example of one grade of such an explosive.

A powerful explosive can also be produced by substituting nitrate of ammonia for the ni-
80 trate of soda or nitrate of potash in the last formula. As nitrate of ammonia is a highly deliquescent substance, it should be first treated with the china-nut oil before being mixed with the other ingredients

In all of the explosive compounds embraced
85 in the foregoing formulas the china-nut oil as one of the elements or substances employed will be found a great improvement in several respects over the various substances that have
90 heretofore been used as a medium or agent to prevent premature explosion and to protect the metallic salts from moisture. It retains its elasticity and adhesiveness under exposure to variations of climate and temperatures, and
95 it does not become brittle or deteriorate in other characteristics by oxidation or other causes after being mixed with the other substances in the compound, so that it forms
100 both a perfect "buffer" between the particles covered by it and also prevents chemical action and changes taking place between the particles in the compound. In these particu-
105 lars it differs materially from many of the liquid and semiliquid hydrocarbons heretofore used for like purposes, such as coal-tar, wood-tar, pitch, asphaltum, paraffin, and maltha.

I am aware that many vegetable oils have also been employed to accomplish the same
110 end; but I have found by prolonged experiments that none of those which have been employed heretofore in the production of this class of explosive can be relied on to remain
115 so constant and unchanged in their properties as this substance, china-nut oil. All explosives containing this oil require to be fired or detonated by a strong fulminate-of-mercury cap.

Having thus described my invention, what I claim, and desire to secure by Letters Pat-
120 ent, is—

1. An explosive compound composed of oxygen-bearing metallic salts, carbon, sulfur and china-nut oil.

2. An explosive compound composed of
125 oxygen-bearing metallic salts, carbon and sulfur, in the form of granules covered by a coating of china-nut oil.

3. That improvement in the manufacture of explosive compounds containing oxygen-
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bearing metallic salts, consisting in reducing
the salts to a fine powder, then adding china-
nut oil in about the proportions specified and
incorporating the same so as to coat the parti-
cles of the salts, and afterward adding the car-
bon and sulfur previously pulverized and mix-
ing all the ingredients together.

In testimony whereof I have hereunto set
my name to this specification in the presence
of two subscribing witnesses.

BOAZ D. PIKE.

Witnesses:

EDWARD E. OSBORN,
M. REGNER.