

# UNITED STATES PATENT OFFICE.

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## EXPLOSIVE COMPOSITION.

No Drawing.

Application filed November 14, 1921. Serial No. 514,980.

*To all whom it may concern:*

Be it known that I, WALTER O. SNELLING, a citizen of the United States, and resident of Allentown, Lehigh County, Pennsylvania, have invented certain Improvements in Explosive Compositions, of which the following is a specification.

Resins and resin-like bodies, and particularly ordinary rosin or colophony, have long been recognized as possessing certain desirable properties as combustible constituents of explosives, and colophony and like bodies containing abietic acid or related organic acids have been used in combination with ammonium nitrate and other oxidizing agents in many explosive compositions. These bodies are added either in powdered form as a direct ingredient, or used as a coating upon ammonium nitrate or other oxidizing material.

In a very large number of types of explosives, the use of these bodies has been found unsatisfactory owing to their tendency, when closely packed together to merge and cake to a solid body, particularly after long storage. Particularly in the case of explosives containing nitrostarch has the use of rosin or rosins been found impractical owing to their acid nature and to the tendency of the acid rosin to hydrolyze the nitrostarch.

I have discovered that the tendency of resins and resinous bodies to cake after long storage can be wholly remedied by transforming these bodies to organic or metallic salts, and that by employing chemically neutral resins and resin esters instead of rosin in explosives comprising nitrostarch or other detonating agent, I obtain all the advantages accruing to the use of rosin, while avoiding the disadvantages which have hitherto prevented the successful use of rosin in explosives. By neutralizing the acid with lime, for example, I obtain calcium abietate, sometimes known as calcium resinate, and this body is substantially free from the tendency to cake on long storage at ordinary temperatures, or even at relatively high temperatures.

The compounds which I prefer to use are the abietates or resins of metals of the alkali earth group, and particularly the abietates or resins of barium, calcium and magnesium. Other metallic resins have

been successfully employed, however, and particularly the resins of the heavy metals, but on account of the greater cheapness and availability of the resins of the alkali earth metals, I prefer to use these bodies.

Instead of these metallic resins, I may use, as previously stated, an organic resin obtained by esterifying rosin, or by combining an acid rosin-like body with an organic base, examples of such organic esters of rosin being glycol ester of rosin and glycerol ester of rosin, the latter being made, for example, by heating chemically equivalent quantities of rosin and of glycerin together for some hours at an elevated temperature in accordance with well known means.

In forming my explosive, I may use either the metallic resins or the rosin esters in widely varying proportions, from small amounts, such as for example 1% or 2% up to 20% or 30%, depending upon the other constituents of my explosive mixture. As illustrating the wide range of explosive compositions made in accordance with my invention, I may use in one form a composition comprising from 20% to 40% of nitrostarch, from 30% to 60% of sodium nitrate, from 5% to 20% of ammonium nitrate, and from 2% to 10% of a metallic resin, while in another embodiment, I prefer to use from 5% to 20% of nitrostarch, from 3% to 12% of sodium nitrate, from 30% to 80% of ammonium nitrate, and from 3% to 20% of a metallic or an organic resin.

The following formula affords a concrete example of a suitable composition involving my invention which has been found to give satisfactory results:

Nitrostarch -----	25.0%	95
Ammonium nitrate coated with 10% glycerol ester of rosin-----	60.0%	
Mineral oil -----	.3%	
Zinc oxide -----	.5%	
Sodium nitrate -----	14.2%	100

Numerous other compositions which will be equally satisfactory could be given. I prefer, however, to use the organic esters of rosin and the metallic resins in quantities varying from 5% to 20% of the entire explosive, although successful results may be obtained both above and below the limits referred to.

I claim:

1. An explosive comprising an oxidizing agent and a resinate.
2. An explosive comprising an oxidizing agent and a metallic resinate.
3. An explosive comprising a detonating agent, an oxidizing agent, and a resinate.
4. An explosive comprising a detonating agent, an oxidizing agent, and a metallic resinate.
5. An explosive comprising an oxidizing agent and a resinate, the latter forming from 5% to 20% of the entire explosive.
6. An explosive comprising an oxidizing agent and a chemically neutral salt of rosin.
7. An explosive comprising nitrostarch, an oxidizing agent, and a chemically neutral salt of rosin.
8. An explosive comprising nitrostarch, an oxidizing agent, and a resinate.
9. An explosive comprising a detonating agent, an oxidizing agent, and a resinate, the latter forming from 5% to 20% of the entire explosive.
10. An explosive comprising a detonating agent, an oxidizing agent, and a chemically neutral salt of rosin.
11. An explosive comprising an oxidizing agent and a solid resinate.

WALTER O. SNELLING.