

UNITED STATES PATENT OFFICE.

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EXPLOSIVE COMPOUND.

1,307,495.

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No Drawing.

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To all whom it may concern:

Be it known that we, ROY LINDEN HILL and ARCHIBALD JACKSON STRANE, citizens of the United States of America, residing at Tamaqua, in the county of Schuylkill and State of Pennsylvania, have invented certain new and useful Improvements in Explosive Compounds, of which the following is a specification.

10 This invention relates to explosive mixtures and more particularly to those explosive mixtures known as "safety" mixtures, wherein a prime object is to render the explosive relatively safe in handling.

15 There is an extensive demand for explosives which do not contain nitroglycerin or other organic nitrates, these explosives being commonly known as "safety" powders. Widespread attempts have been made to satisfy the demand with explosives which contain ammonium nitrate as the principal ingredient. Among other ingredients that have been used are nitro-aromatics, combustible but not explosive carbonaceous materials, and various inorganic salts.

25 While explosives of the nature referred to present a great improvement over those containing an organic nitrate, as far as safety in handling is concerned, they frequently present the very great objection of lack of sensitiveness to the initial detonation and inability to propagate it. To offset this objection it has been necessary to take extensive precautions during the manufacture of the explosive with respect to the incorporation and freedom from moisture of the materials used and the methods of packing the same. While satisfactory explosives have been produced as a result of these precautions such explosives frequently become hard. This hardness results in an increased lack of sensitiveness, occasionally to the extent of failure to detonate even with the strongest caps.

45 We have found that we can prevent such explosives from becoming hard by introducing into their composition certain amounts of copper sulfate (varying from five-tenths to ten per cent. from which the water of crystallization has been partly or com-

pletely removed. The copper sulfate may be added to any ingredient individually or to any mixture of ingredients which go to make up the finished explosive. We prefer to add it after all of the other ingredients of the explosive have been partially mixed.

The following composition is illustrative of an embodiment of the invention but it is to be understood that the invention is not limited thereto because the copper sulfate may be advantageously employed in other compositions of the nature described:

Ammonium nitrate----	88 per cent.	
Trinitrotoluene -----	10 per cent.	
Copper sulfate-----	2 per cent.	65

Having thus clearly set forth the essential features of our invention and shown by example how the same may be applied, what we claim and desire to secure by Letters Patent of the United States is:—

1. An explosive comprising copper sulfate and ammonium nitrate as its principal ingredient.

2. An explosive comprising copper sulfate and ammonium nitrate as its principal ingredient and which is free of organic nitrate.

3. An explosive comprising copper sulfate from which the water of crystallization has been removed and ammonium nitrate.

4. An explosive comprising from five-tenths per cent. to ten per cent. of copper sulfate from which the water of crystallization has been removed and ammonium nitrate.

5. An explosive comprising from five-tenths per cent. to ten per cent. of copper sulfate from which the water of crystallization has been at least partly removed and ammonium nitrate, the latter constituting the principal ingredient.

In testimony whereof we affix our signatures in the presence of two witnesses.

ROY LINDEN HILL.
ARCHIBALD J. STRANE.

Witnesses:

WM. H. WOODWELL,
HARRY J. KRAMER.