

UNITED STATES PATENT OFFICE

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AMMONIUM NITRATE SENSITIZED BY AMINO COMPOUNDS

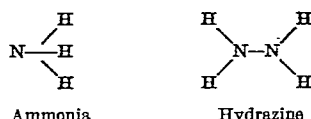
No Drawing.

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This invention relates primarily to ammonium nitrate and to ammonium nitrate explosives. The principal object of the invention is to provide by novel methods an improved ammonium nitrate and ammonium nitrate explosive of relatively high sensitiveness.

The utility of ammonium nitrate as an ingredient of explosive compositions is somewhat limited by reason of the low order of sensitiveness, and some efforts have been made to increase the sensitiveness thereof to detonation. We have discovered that certain substances when suitably compounded with ammonium nitrate have a pronounced effect upon the sensitiveness of ammonium nitrate toward detonation.

Our invention contemplates the use with ammonium nitrate of sulphur-free hydrazine or ammonia derivatives characterized by the presence in the compound of at least one aromatic ring or nucleus. The formulæ of ammonia and hydrazine may be given as follows:



From a consideration of the formulæ, it is to be noted that both compounds, ammonia and hydrazine, are compounds of nitrogen and hydrogen. It is from one or the other of these nitrogen-hydrogen compounds that the compounds of the present invention owe their origin, that is to say, the compounds of the present invention may be considered as substitution products or derivatives of the nitrogen-hydrogen compounds. The derivatives to be used in accordance with the present invention, therefore, may be termed, and are so termed for convenience throughout the specification and claims, "a sulphur-free derivative of a nitrogen-hydrogen compound in which at least one of the hydrogen atoms has been replaced by an aromatic ring."

This term it will be recognized, embraces a large class of compounds and, as representative of the different derivatives which are applicable for the present invention and

which are included within the term, we may name aniline, toluidine, naphthylamine, anthramine, diphenylamine, ditolylamine, phenylenediamine, tolylenediamine, benzidine, tolidine, phenylhydrazine, diphenylhydrazine, tolylhydrazine, and the like. No attempt has been made to make the list complete, but the above compounds may be considered representative. As hereinbefore pointed out, one or more of the hydrogen atoms of the nitrogen-hydrogen compound is replaced by an aromatic nucleus. Two hydrogen molecules may be replaced by two aromatic rings or by an aliphatic group and an aromatic ring. The substitution of the aromatic ring or rings for the hydrogen atom or atoms may take place in one molecule of ammonia or similar compound consisting solely of nitrogen and hydrogen, thus producing compounds such as aniline, diphenylamine, etc., or one hydrogen atom may be replaced in each of two molecules of ammonia or similar compound consisting solely of nitrogen and hydrogen, thus producing compounds such as phenylenediamine. We have also found that simple oxidation products of the above named derivatives may be used to advantage according to the present invention in order to increase in a pronounced degree the sensitiveness of ammonium nitrate toward detonation. Such compounds include phenylhydroxylamine, azobenzene, and azoxybenzene. These simple oxidation products are also within the term "a sulphur-free derivative of a nitrogen-hydrogen compound in which at least one of the hydrogen atoms has been replaced by an aromatic ring", and in the claims where this term is used, these oxidation products are to be included as well as the other compounds which may be considered to be sulphur-free derivatives of ammonia or hydrazine in which at least one of the hydrogen atoms has been replaced by an aromatic ring.

In practicing our invention, the sensitizing agents may be used in amounts equal to 3% of the weight of the ammonium nitrate, although we do not limit ourselves to this percentage, and a suitably sensitized product has

azobenzene, azoxybenzene, said compound being present in an amount equal to from 1% to 6% of the weight of the ammonium nitrate.

8. An explosive comprising nitrostarch, and ammonium nitrate sensitized with a compound selected from the following group,—aniline, toluidine, naphthylamine, anthramine, diphenylamine, ditolylamine, phenylenediamine, tolylenediamine, benzidine, tolidine, phenylhydrazine, diphenylhydrazine, tolylhydrazine, phenylhydroxylamine, azobenzene, azoxybenzene.

9. The method of sensitizing ammonium nitrate which comprises intimately mixing said nitrate with a compound selected from the following group,—aniline, toluidine, naphthylamine, anthramine, diphenylamine, ditolylamine, phenylenediamine, tolylenediamine, benzidine, tolidine, phenylhydrazine, diphenylhydrazine, tolylhydrazine, phenylhydroxylamine, azobenzene, azoxybenzene.

10. The method of sensitizing ammonium nitrate which comprises co-crystallizing said nitrate with a compound selected from the following group,—aniline, toluidine, naphthylamine, anthramine, diphenylamine, ditolylamine, phenylenediamine, tolylenediamine, benzidine, tolidine, phenylhydrazine, diphenylhydrazine, tolylhydrazine, phenylhydroxylamine, azobenzene, azoxybenzene.

11. An explosive comprising ammonium nitrate sensitized with phenylhydrazine.

12. An explosive comprising ammonium nitrate in intimate contact with phenylhydrazine.

13. The method of sensitizing ammonium nitrate which consists in intimately mixing said nitrate with phenylhydrazine.

14. An explosive comprising ammonium nitrate in intimate admixture with aniline, the aniline being present in an amount equal to from 1% to 6% of the weight of the ammonium nitrate.

15. An explosive comprising ammonium nitrate in intimate admixture with phenylhydrazine, the phenylhydrazine being present in an amount equal to from 1% to 6% of the weight of the ammonium nitrate.

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