

UNITED STATES PATENT OFFICE.

HUDSON MAXIM, OF HOPATCONG BOROUGH, NEW JERSEY.

LIQUID COMPOSITION FOR DRIVING SELF-PROPELLED TORPEDOES.

No Drawing.

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To all whom it may concern:

Be it known that I, HUDSON MAXIM, a resident of the borough of Hopatcong, county of Sussex, and State of New Jersey, have
5 invented certain new and useful Improvements in Liquid Composition for Driving Self-Propelled Torpedoes, of which the following is a specification.

The object of the invention is mainly to
10 provide in liquid form a self-combustive explosive material for employment as a fuel for the production of combined steam and products of combustion for actuating a turbine or other means for propelling torpedoes.
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In carrying out the invention, I preferably employ a solution of ammonium nitrate in a combustible solvent such as alcohol or its equivalent, or a solution of ammonium nitrate in water and a self-combustive or explosive solvent such as a mixture of alcohol and di-nitroglycerin or other suitable self-combustive or explosive oxidizing agent or material which is a solvent of or is soluble
20 in the solvent of the ammonium nitrate.
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Ammonium nitrate being completely soluble at 60° F. in half its weight of water, and still more soluble in such a quantity of water with the addition of alcohol thereto, I have
30 found good results from the employment of an aqueous alcoholic solution of ammonium nitrate, consisting of eight parts ammonium nitrate and four parts water and two parts alcohol, but this compound is rendered more readily inflammable and self-combustive
35 in the combustion chamber of a torpedo, by the addition of a certain proportion of di-nitroglycerin. The larger the proportion of di-nitroglycerin added, the more readily is the material rendered inflammable, and I have
40 found good results from the employment of a solution consisting of eight parts ammonium nitrate, four parts water, two parts alcohol and sixteen parts di-nitroglycerin.

Any excess of heat in the products of combustion and steam as they escape from the combustion chamber of the torpedo, that is to say, at the nozzle of the torpedo, above
45 1100° F., or above what may be practicable or desirable, is absorbed by the addition of water to the escaping stream of products of combustion. The water may be with advantage and preferably is forced by the flame blast through a suitable mixing or atomizing
50 device, and the steam and products of com-

bustion utilized for actuating a turbine or to serve by other means to drive a torpedo.

It will be seen that part or all of the needed water may be added to and form a part of the self-combustive and explosive
60 liquid fuel, but instead of using any water in the solution of ammonium nitrate and alcohol, I may and sometimes do employ a solution of ammonium nitrate in alcohol or alcohol and di-nitroglycerin without the ad-
65 dition of water, any excess alcohol beyond that required to combine with the excess of oxygen in the ammonium nitrate being evaporated by the heat of reaction of inflammation or decomposition of the ammonium
70 nitrate.

What is claimed is:—

1. A self-combustive liquid fuel for evaporating water for driving torpedoes, containing the whole or part of the water to
75 be evaporated.

2. A liquid fuel for driving torpedoes, consisting of an explosive material dissolved in a solution of water and another combustible.
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3. A liquid fuel for driving torpedoes, consisting of ammonium nitrate dissolved in water, together with a combustible element or substance, sufficient to combine with the excess of oxygen liberated by the de-
85 composition of the ammonium nitrate.

4. A liquid explosive material for driving torpedoes, consisting of a solution of ammonium nitrate, water, and di-nitro-
90 glycerin.

5. A self-combustive fuel for driving torpedoes, consisting of ammonium nitrate, di-nitroglycerin and another combustible material.

6. A self-combustive liquid fuel for driving torpedoes, containing ammonium nitrate dissolved in a medium, of which a combustible solvent of ammonium nitrate is an in-
95 gredient.

7. A liquid fuel for driving torpedoes, containing ammonium nitrate and another explosive material in solution.
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8. A liquid fuel for driving torpedoes, consisting of a solution of ammonium nitrate containing other ingredients which
105 render the solution capable of being vaporized and enflamed in the combustion chamber of the torpedo by the heat of reaction of self-combustion of the liquid.

9. A liquid fuel for driving torpedoes, 110

consisting of a solution of ammonium nitrate containing other ingredients which render the solution capable of being vaporized and enflamed in the combustion chamber of the torpedo by the heat of reaction of self-combustion of the liquid, and capable of being detonated or exploded by the detonation or explosion of the warhead.

10. A liquid self-combustive fuel for driving torpedoes, consisting of a solution of an oxidizing salt and combustible material whereby the liquid is rendered capable of being vaporized and enflamed without detonation in the combustion chamber of the torpedo by the heat of its own reaction.

11. A liquid self-combustive fuel for driving torpedoes, consisting of a solution of an oxidizing salt and combustible material whereby the liquid is rendered capable of being vaporized and enflamed without detonation in the combustion chamber of the torpedo by the heat of its own reaction, and capable of being detonated by the detonation of the warhead when in proximity to the warhead at the moment of detonation of the warhead.

12. A self-combustible liquid fuel for torpedoes, consisting of a solution of ammonium nitrate in a suitable solvent as shall adapt the solution to be vaporized and enflamed by the heat of its own combustion or decomposition without detonation in the combustion chamber of the torpedo.

13. A self-combustive and explosive liquid fuel for torpedoes, consisting of a solution of ammonium nitrate in a suitable solvent as shall adapt the solution to be vaporized and enflamed by the heat of its own combustion or decomposition without detonation in the combustion chamber of the torpedo, and furthermore adapted, when in proximity to the warhead of the torpedo, to be detonated or exploded by the detonation or explosion of the warhead.

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

HUDSON MAXIM.

Witnesses:

LILLIAN MAXIM,
M. V. BIRNEY.