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(54) GAS-GENERATING LIQUID COMPOSITIONS (PERHAN)

6,179,937 * 12/2001 Leveritt et al. 149/45

OTHER PUBLICATIONS

(75) Inventor: Kerry L. Wagaman, Bryantown, MD (US)

Anderson, W., et al. Low Cost Propulsion Using a High-Density, Storable, and Clean Propellant Combination.

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Mul, et al. Search For New Storable High Performance Propellants, (AIAA-88-3354, AIAA/ASME/SAE/ASEE 24th Joint Propulsion Conference, Boston, Jul. 1988).

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

Rusck, J., New Decomposition Catalysts And Characterization Techniques For Rocket-Grade Hydrogen Peroxide J. of Propulsion and Power, 1996, 12, 574-579.
A document entitled Advanced Chemical Propulsion Systems dated Nov. 21, 1995.

(21) Appl. No.: 09/447,271

Berezovsky, Pyrogen Fire Suppression System-Marine & Vehicle Applications Dated Aug. 1997.

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Thomas, Martin, Fire Research News 20.

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* cited by examiner

(52) U.S. Cl. 149-45

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(56) References Cited

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U.S. PATENT DOCUMENTS

H1768	1/1990	Mueller et al.
3,145,082	* 8/1964	Rausch et al. 423.25
3,561,533	2/1971	McKinnell .
3,790,415	2/1974	Tomic .
4,047,988	9/1977	Weill et al.
4,527,389	* 7/1985	Biddle et al. 60/207
5,607,181	3/1997	Richardson et al.
5,648,052	* 7/1997	Schaefer et al. 422.306
5,703,323	12/1997	Rothgery et al. 149.88
6,013,143	* 1/2000	Thompson 149.1
6,098,516	* 8/2000	Gazouas 85/20.15

(57) ABSTRACT

A family of water-based, gas-generating liquid compositions is described. A composition of the present invention includes: hydrogen peroxide, hydroxylammonium nitrate, and water. Compositions of the present invention may be mixed with fuels to make monopropellants or used in bipropellant or hybrid systems. Alternate uses of the present invention include breathable gas generation or use as an oxygen source in welding

22 Claims, 2 Drawing Sheets

Freezing Points for PERHAN Formulations

