



US006419856B1

(12) **United States Patent**  
**Cirrito et al.**

(10) **Patent No.:** **US 6,419,856 B1**  
(45) **Date of Patent:** **Jul. 16, 2002**

(54) **METHOD AND APPARATUS FOR TOTAL ENERGY FUEL CONVERSION SYSTEMS**

(74) *Attorney, Agent, or Firm*—Schnader Harrison Segal & Lewis LLP

(75) Inventors: **Anthony Cirrito**, East Sandwich, MA (US); **Bernard Ennis**, Cedar Grove, NJ (US)

(57) **ABSTRACT**

(73) Assignee: **EGT Developments, LLC**, Cedar Grove, NJ (US)

An independent and conserved source of fuel and/or power comprises a top stage rocket engine firing up to 5000 F. at very high pressures, delivering jet flows up to transonic velocities into a near adiabatic tunnel for mixing in general and/or for transforming reactants introduced selectively. The related compression is supplied by an independent prime mover which compresses its exhaust and other recoverable fluids. Low grade flows, thereby upgraded in temperature and pressure, are adiabatically contained, are further upgraded in the tunnel to become part of the prescribed fuel for export at the tunnel ends; or fuel to be fired in a prime mover for electric or other power; or hydrogen for chemical use. Expansion turbines for this purpose are relieved of the load used to compress the excess air in standard gas turbines thus increasing export power. A portion of the expansion turbine's exhaust becomes part of recoverable fluids. When oxygen is used instead of air, the gases through turbines are nitrogen-free with more heat capacity reducing turbine inlet temperatures for the same power. When reactant transformation is specified, the larger water vapor content in the cycle enhances the water gas/shift autothermally for ammonia and/or power and alternatively at lower pressures for pyrolysis cracking for olefins and diolefins. Further, staging rocket engine reactors increases efficiency in boilers and steam turbines; and staging can produce sponge iron and iron carbide selectively with expansion turbine power and fuel cells for peak and off-peak loads.

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

(21) Appl. No.: **09/276,874**

(22) Filed: **Mar. 26, 1999**

**Related U.S. Application Data**

(62) Division of application No. 08/771,875, filed on Dec. 23, 1996, now Pat. No. 5,938,975.

(51) **Int. Cl.**<sup>7</sup> ..... **C07C 1/02**

(52) **U.S. Cl.** ..... **252/373; 423/439**

(58) **Field of Search** ..... **423/439; 252/373**

(56) **References Cited**

**PUBLICATIONS**

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*Primary Examiner*—Samuel Barts  
*Assistant Examiner*—Elvis O. Price

**34 Claims, 8 Drawing Sheets**