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

(57) Abstract

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 to suit specific objectives. 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 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/or iron carbide as well as expansion turbine power and fuel cells for peak and off-peak loads.

Rocket Engine Power Source for
Expansion Turbines
Case 1 - Single and Multi Stage-Turbines

