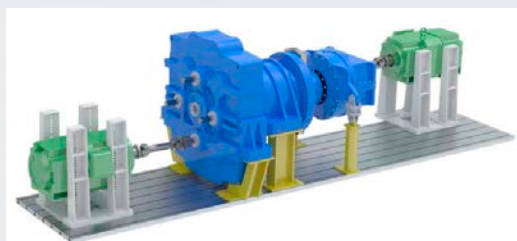



ABS Wind welcome Edwin Hahlbeck as part of the team incharge of Grupo Penoles Clipper Gearbox study and repair project

Mr. Hahlbeck was responsible for the mechanical system design and operation of the "The Quantum Distributed Generator drivetrain" system and the mechanical test method. He was also responsible for the rotating machinery test apparatus design. He is a co-inventor of the patented DGENQ (The Quantum Distributed Generator drivetrain. The next generation of distributed generation drive-train technology tested on the NREL). He began his gear related career in 1958, completing a mechanical drafting apprenticeship in 1961 at Falk Corporation in Milwaukee, WI. Mr. Hahlbeck served in progressive management positions at Falk and later at Milwaukee Gear Company. His experience included VP responsibilities involving manufacturing, manufacturing engineering and product engineering. His innovative work included instruction in manufacturing methods, computer applications in manufacturing, and gear design. Powertrain is a recognized face in alternative energy equipment design and development with extensive experience in wind turbine drive lines and water current turbine drives. Mr. Hahlbeck has participated in US government review panels for alternative energy program obstacles to attainment of 2030 goals.

Mr. Hahlbeck is joining the multidisciplinary team created by ABS Wind and SKF Mexico for this unique project. This team also counts with the important collaboration of MGS Gears (Italy), The Timken Company, Solid Works Cosmo FEM analysis department, consultants PhD. J. Dulong (welding science), PhD. JM Escanaverino (AGMA), Jake/Bradford (Original manufactured for the Clipper Gearbox internal gears) to name a few.





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(12) **United States Patent** (10) Patent No.: **US 7,069,802 B2**
 Mikhail et al. (45) Date of Patent: **Jul. 4, 2006**

(54) **DISTRIBUTED POWER TRAIN (DGD) WITH MULTIPLE POWER PATHS**
 (57) Inventors: Amir S. Mikhail, Scott Harbors, CA (US); **Edwin G. Hahlbeck, Des Moines, WI (US)**

(73) Assignee: **Clipper Windpower Technology, Inc., Carpinteria, CA (US)**

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 464 days.

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 (52) U.S. Cl. **74/410; 74/410; 74/428; 605 G; 605 C/A; 605 C/D**
 See application file for complete search history.

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 (45) Date of Patent: **Jul. 4, 2006**

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ABSTRACT

An electric power-generating device with a rotor turned by an external source of energy, such as wind or water currents. The rotor is coupled to a main shaft. A pair of bull gears is located on the main shaft. A number of intermediate gears are located around a periphery of the bull gears. An intermediate gear is connected to an input shaft having a double helix pinion that engages the pair of bull gears. The other intermediate gears are similarly connected to respective input shafts having double helix pinions that engage the pair of bull gears. A plurality of output shafts is provided. An output shaft has a single helix output pinion that engages two adjacent intermediate gears. The other output shafts are similarly connected to respective adjacent intermediate gears. A number of rotational devices are connected to the output shafts.

21 Claims, 4 Drawing Sheets

