United States Patent [19]
Johnson
[11] 4,151,431
[45] Apr. 24, 1979

[54] **PERMANENT MAGNET MOTOR**

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[21] Appl. No.: **422,306**

[22] Filed: **Dec. 6, 1973**

[51] **Int. Cl.**[2] **H02K 41/00**; H02N 11/00
[52] U.S. Cl. 310/12; 310/152
[58] **Field of Search** ..... 24/DIG. 9; 415/DIG. 2; 46/236; 273/118 A, 119 A, 120 A, 121 A, 122 A, 123 A, 124, 125 A, 126 A, 130 A, 131 A, 131 AD, 134 A, 135 A, 136 B, 137 AE, 138 A

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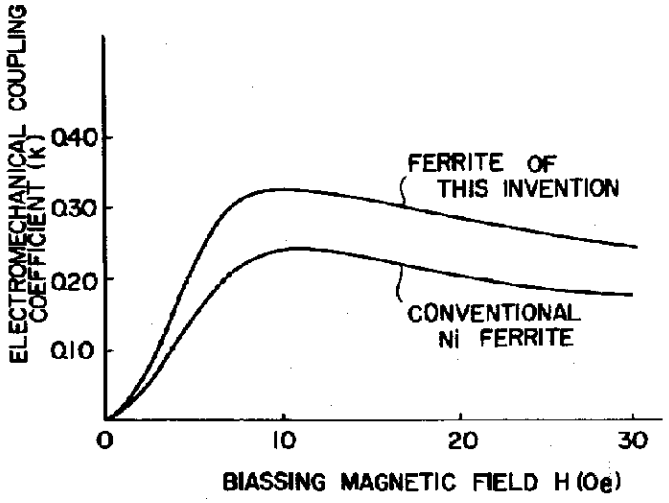
[57] **ABSTRACT**

The invention is directed to the method of utilizing the unpaired electron spins in ferro magnetic and other materials as a source of magnetic fields for producing power without any electron flow as occurs in normal conductors, and to permanent magnet motors for utilizing this method to produce a power source. In the practice of the invention the unpaired electron spins occurring within permanent magnets are utilized to produce a motive power source solely through the superconducting characteristics of a permanent magnet and the magnetic flux created by the magnets are controlled and concentrated to orient the magnetic forces generated in such a manner to do useful continuous work, such as the displacement of a rotor with respect to a stator. The timing and orientation of magnetic forces at the rotor and stator components produced by permanent magnets to produce a motor is accomplished with the proper geometrical relationship of these components.

28 Claims, 10 Drawing Figures



United States Patent [19]
Akimoto et al.
[11] 4,151,432
[45] Apr. 24, 1979

[54] **PRODUCTION OF FERRITES FOR MAGNETOSTRICTIVE VIBRATORS**

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[73] Assignee: **Mitsubishi Kinzoku Kabushiki Kaisha**, Japan

[21] Appl. No.: **663,732**

[22] Filed: **Mar. 4, 1976**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 484,869, Jul. 1, 1974, abandoned.

[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.** **310/26**; **264/DIG. 58**; 335/215; 335/296; 335/302; 366/127
[58] **Field of Search** 310/26; 264/DIG. 58; 366/127; 335/296, 215, 302

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Assistant Examiner—John A. Parrish
Attorney, Agent, or Firm—Robert E. Burns; Emmanuel J. Lobato; Bruce L. Adams

[57] **ABSTRACT**

A ferrite for magnetostrictrive vibrators is produced by the simple process of press forming a preformed structure formed from starting powder of magnetite or a mixture of magnetite and ferric oxide, said powder having an average particle size d (μ) of from 0.02 to 5.0 μ, sintering this structure in an atmosphere wherein the partial pressure of oxygen is from 10^{-1} to 10^{-11} atmosphere at a temperature of from 1,000° to 1,350° C. and which will meet the requirement:

$$140 \log d + 1.305 \geq f(\text{KHz}) \geq 160 \log d + 1.130$$

and thereafter cooling the structure thus sintered to room temperature at a cooling rate m (°C./min.) $< 0.5f$ where f(KHz) is a corresponding resonance frequency thereby to produce a macroscopically homogeneous ferrite structure containing as its principal constituent a sintered magnetite having an oxygen/iron (O/Fe) atomic ratio of $4.0/3 < O/Fe < 4.1/3$, and a density of at least 90% of the theoretical density.

6 Claims, 23 Drawing Figures