



US006710562B1

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

(10) **Patent No.:** **US 6,710,562 B1**
(45) **Date of Patent:** **Mar. 23, 2004**

(54) **SYNCHRONOUS MOTOR WITH AN ELECTRONIC CONTROL DEVICE FOR ADJUSTING DEVICES IN MOTOR VEHICLES AND METHOD FOR CONTROLLING THEM**

6,304,048 B1 * 10/2001 Davies et al. 318/475
6,426,604 B1 * 7/2002 Ito et al. 318/466

FOREIGN PATENT DOCUMENTS

DE	30 341 118 C2	3/1982
DE	40 19 787 A1	1/1991
DE	195 02 306 A1	8/1996
DE	297 07 440 U1	7/1997
DE	197 07 850 C1	3/1998
DE	198 09 628 A1	9/1999
EP	0 482 040 B1	4/1992
JP	57-78357	5/1982
JP	4-231	1/1992

(75) Inventors: **Roland Kalb**, Rossach (DE); **Craig Kinnell**, Coburg (DE)

(73) Assignee: **Brose Fahrzeugteile GmbH & Co. KG**, Coburg (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 13 days.

* cited by examiner

Primary Examiner—Bentsu Ro

(74) *Attorney, Agent, or Firm*—Christie, Parker & Hale, LLP

(21) Appl. No.: **10/129,465**

(22) Filed: **Aug. 2, 2002**

(30) **Foreign Application Priority Data**

Nov. 2, 1999 (DE) 199 52 572

(51) **Int. Cl.**⁷ **E05F 15/16**

(52) **U.S. Cl.** **318/434; 318/286; 318/432; 318/437**

(58) **Field of Search** 318/264, 265, 318/266, 286, 432, 433, 434, 437, 466, 468, 469

ABSTRACT

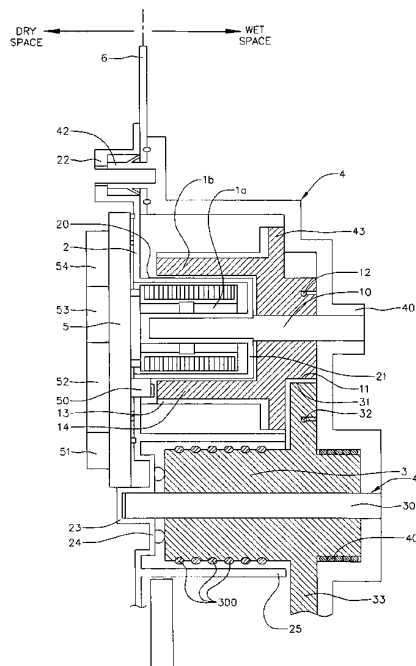
(57) A method for controlling a synchronous motor driven adjustment device is used in motor vehicles by means of an electronic control, especially for controlling adjustment devices with an anti-trap protection and/or with an excess force limitation. The method includes evaluating variables correlating to the dynamics of the adjusting device or the position of the adjustment member and generating control signals based on the variables, controlling the adjustment rate of the adjustment member to a constant value, and setting a phase displacement between an exciting field and a rotating field of the motor to provide torque to the drive unit based on the load angle at which the torque reaches a maximum.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,468,596 A 8/1984 Kinzl et al.
5,245,258 A 9/1993 Becker et al.
6,239,610 B1 * 5/2001 Knecht et al. 324/772

17 Claims, 3 Drawing Sheets



UUSI, LLC
Exhibit 2027

WEBASTO ROOF SYSTEMS, INC.
Petitioner
v.
UUSI, LLC
Patent Owner

Case:
IPR2014-00650
Patent: 7,579,802



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(57) **ABSTRACT**

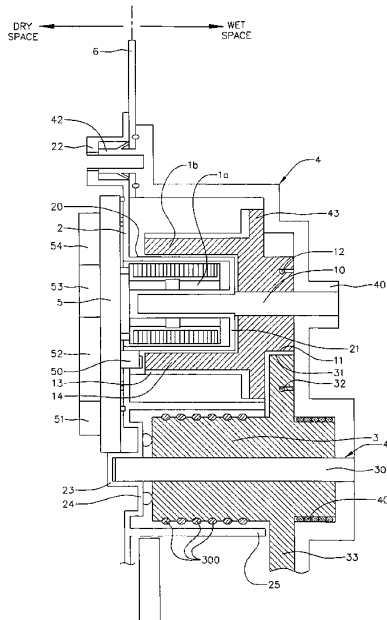
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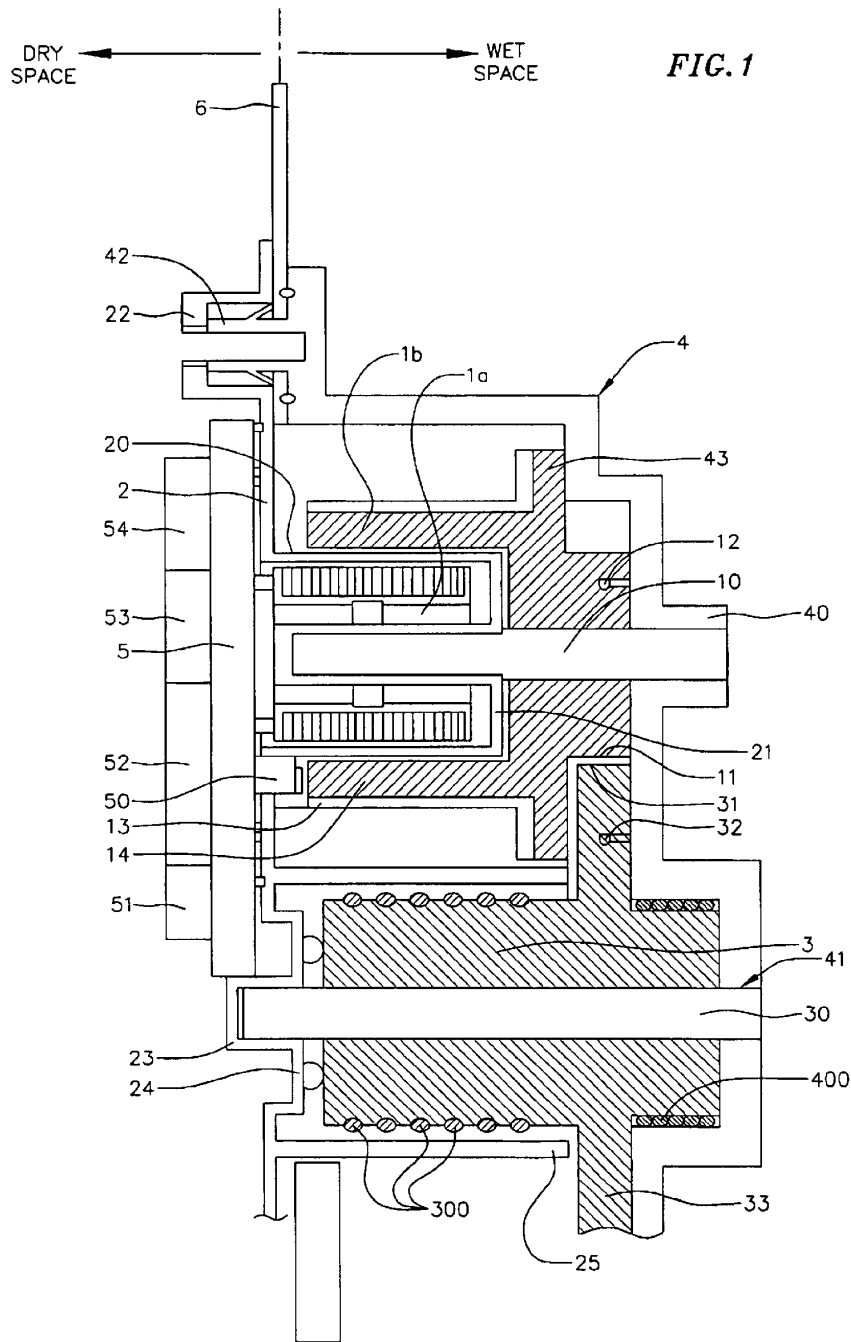
17 Claims, 3 Drawing Sheets



UUSI, LLC
Exhibit 2031

WEBASTO ROOF SYSTEMS, INC.
Petitioner
v.
UUSI, LLC
Patent Owner

Case:
IPR2014-00648
Patent: 8,217,612



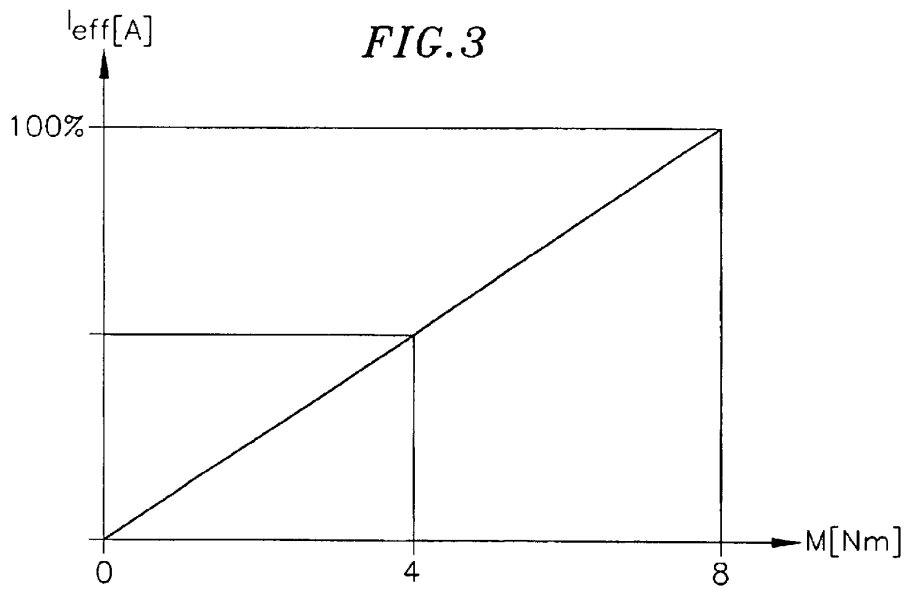
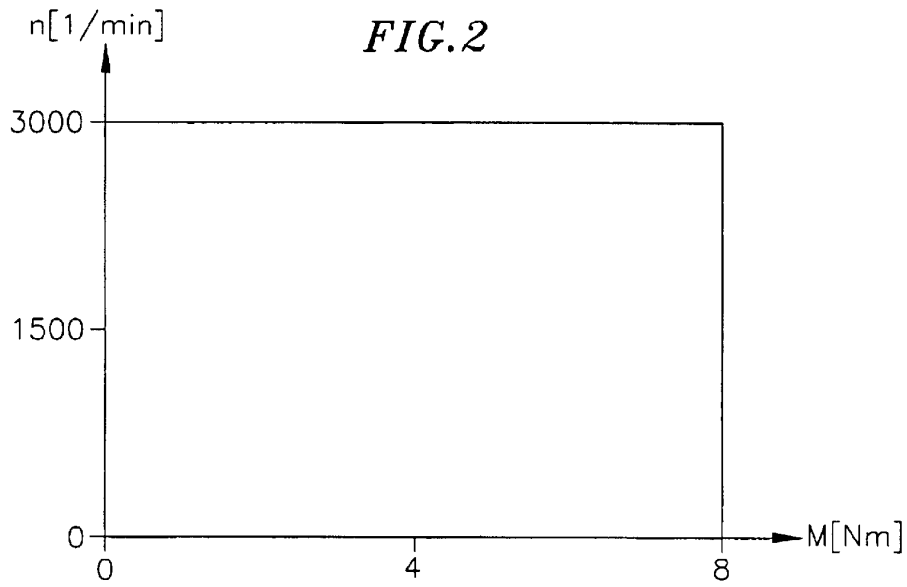
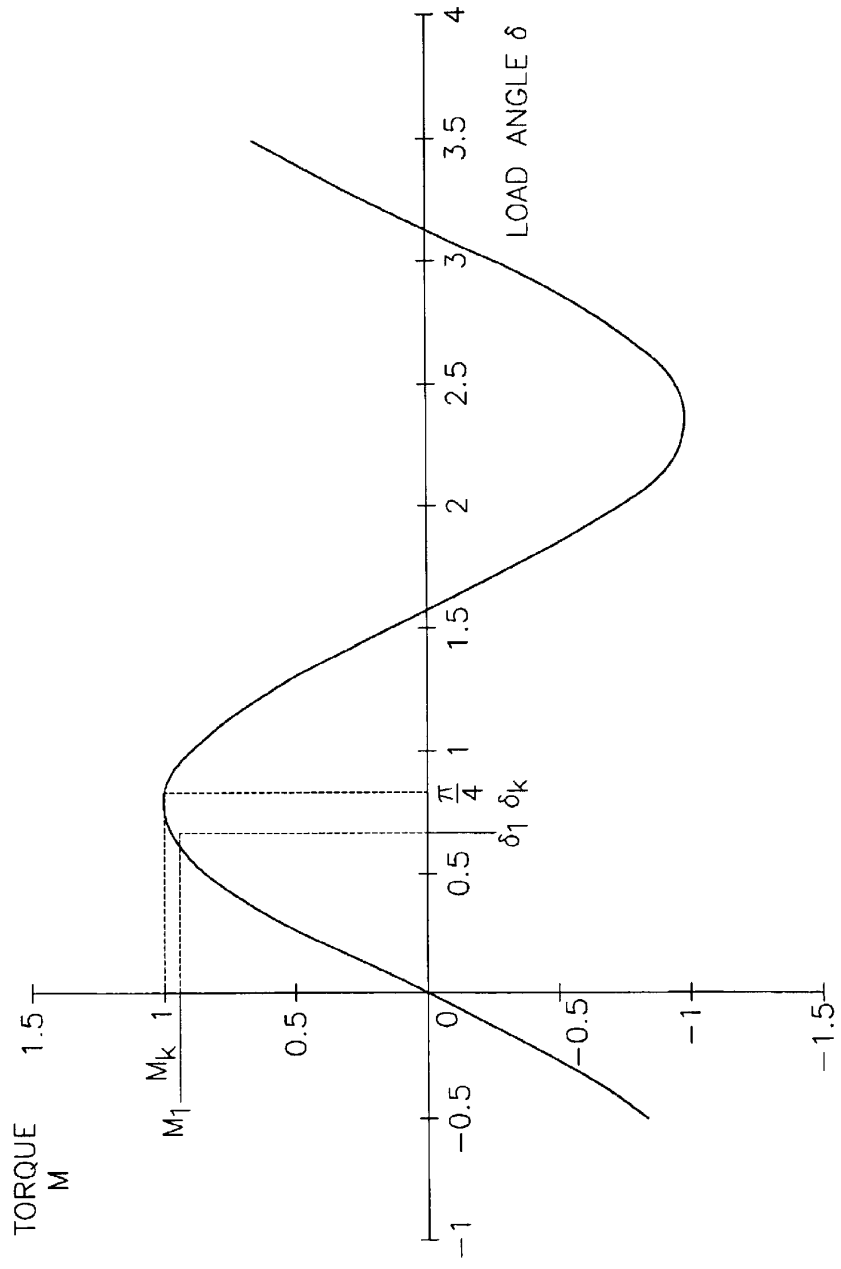


FIG. 4



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