

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZHONGSHAN BROAD OCEAN MOTOR CO., LTD.,
BROAD OCEAN MOTOR LLC, and
BROAD OCEAN TECHNOLOGIES, LLC,
Petitioner,

v.

NIDEC MOTOR CORPORATION,
Patent Owner.

Case IPR2014-01121¹
Patent 7,626,349 B2

Before SALLY C. MEDLEY, JUSTIN T. ARBES,
BENJAMIN D. M. WOOD, JAMES A. TARTAL, and
PATRICK M. BOUCHER, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ Case IPR2015-00762 has been joined with this proceeding.

I. INTRODUCTION

A. Background

The trial in this proceeding resulted from the filing of two petitions by Zhongshan Broad Ocean Motor Co., Ltd., Broad Ocean Motor LLC, and Broad Ocean Technologies, LLC (collectively, “Petitioner”). First, in response to a corrected petition (Paper 7², “Pet. 1121”) filed in IPR2014-01121, the Board instituted trial with respect to the following ground of unpatentability: claims 1–3, 8, 9, 12, 16, and 19 as unpatentable under 35 U.S.C. § 103(a) over U.S. Patent No. 5,410,230 (Ex. 1006, “Bessler”) and Peter Franz Kocybik, *Electronic Control of Torque Ripple in Brushless Motors* (University of Plymouth, July 2000) (Ex. 1007, “Kocybik”). Paper 20, 17. Second, in response to the concurrent filing in IPR2015-00762 of a petition (IPR2015-00762, Paper 3, “Pet. 762”) and a Motion for Joinder (IPR2015-00762, Paper 4), the Board instituted trial with respect to the following ground of unpatentability, and joined IPR2015-00762 with IPR2014-01121: claims 1–3, 8, 9, 12, 16, and 19 as anticipated under

² Unless otherwise indicated, citations are to IPR2014-01121. In some instances, the parties filed papers under seal with concurrently filed public redacted versions; unless otherwise indicated, citations are to public versions of the papers.

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35 U.S.C. § 102(b) by JP 2003-348885 (Ex. 1003³, “Hideji”). Paper 67, 9–10. Patent Owner timely filed Patent Owner Responses. Papers 30, 72. Petitioner timely filed Replies to the Patent Owner Responses. Papers 36, 78. An oral hearing was held on February 23, 2016. Paper 85 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c). This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has shown, by a preponderance of the evidence, that claims 1–3, 8, 9, 12, 16, and 19 are unpatentable.⁴

B. The ’349 Patent (Ex. 1001)

The ’349 patent relates to heating, ventilating, and/or air conditioning (“HVAC”) systems that use air-moving components, such as a blower. Ex. 1001, col. 1, ll. 8–11. Figure 4 of the ’349 patent is reproduced below.

³An unattested English translation of Hideji was filed as Ex. 1005 in IPR2014-01121. An attested English translation of Hideji was filed as Ex. 1005 in IPR2015-00762. Except for the attestation, the translations are identical. Accordingly, to simplify citation to the record, we subsequently cite to Ex. 1005 of IPR2014-01121 for citations to Hideji.

⁴Judges Wood and Boucher disagree with Judges Medley, Arbes, and Tartal that 35 U.S.C. § 315(c) permits issues presented in IPR2015-00762 to have been joined to IPR2014-01121. Paper 67 (Boucher, APJ, dissenting).

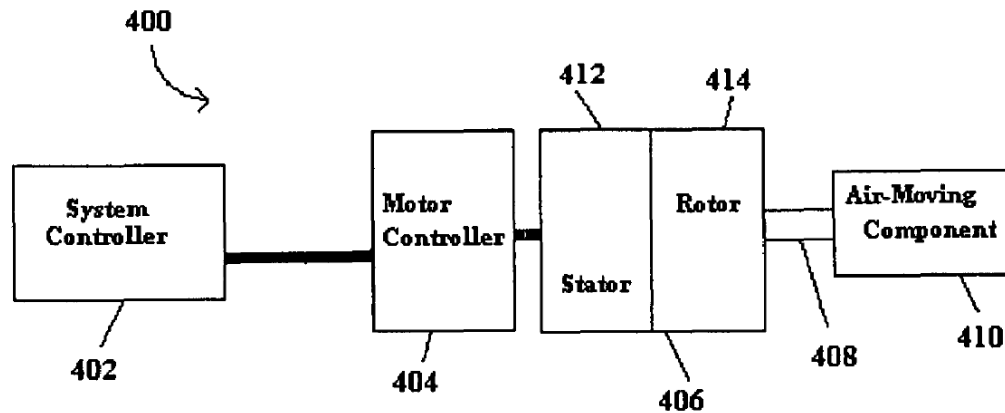
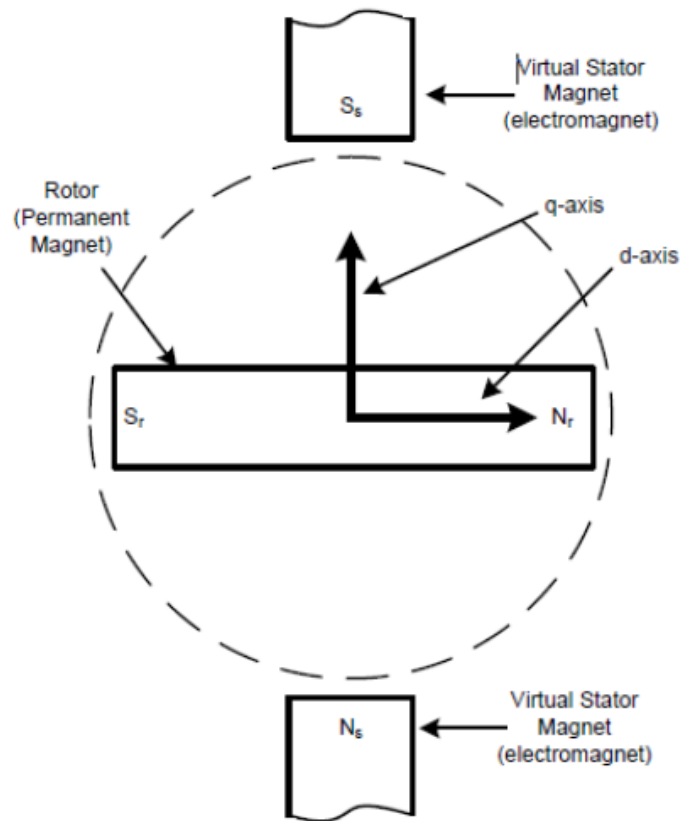


Figure 4

Figure 4 is a block diagram of HVAC system 400, which includes system controller 402, motor controller 404, permanent magnet motor 406, and air-moving component 410. *Id.* at col. 3, ll. 50–52. Permanent magnet motor 406 includes shaft 408, stationary assembly 412, and rotatable assembly 414. *Id.* at col. 3, ll. 52–54. The rotatable and stationary assemblies are magnetically coupled, and the rotatable assembly is coupled to the air-moving component via the shaft to drive rotation of the air-moving component. *Id.* at col. 3, ll. 54–58. The motor controller is configured to perform sinewave commutation in response to one or more control signals received from the system controller to produce continuous-phase currents in the permanent magnet motor for driving the air-moving component. *Id.* at col. 3, ll. 59–63.

Petitioner’s expert, Dr. Mark Ehsani, provides an explanation of “vector control” of permanent-magnet synchronous motors, which we accept

as an accurate description of the understanding of one of ordinary skill in the art. Dr. Ehsani explains that “[t]he concept of vector control, which typically uses d and [Q] current components, arises from [a] principle [in which] torque arrives from the interaction of two magnetic fields, one originating from the stator and one originating from the rotor.” Ex. 1009 ¶ 13. The drawing from page 6 of Dr. Ehsani’s Declaration is reproduced below.



The drawing from Dr. Ehsani’s Declaration illustrates a rotor, which has a permanent magnet having north and south poles N_r and S_r , respectively, and illustrates a stator, which includes electromagnets that result in a virtual

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