

Case IPR2014-01121
Patent 7,626,349

IN THE 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**

Petitioners

v.

Nidec Motor Corporation

Patent Owner

Case IPR2014-01121

Patent 7,626,349

DECLARATION BY MARK E. CARRIER

1. I, Mark E. Carrier, am one of the joint inventors named in U.S. Patent No. 7,626,349 (the “349 patent”), which is the subject of the above-referenced *inter partes* review proceeding. I am presently the Vice President of New Product Development at Nidec Motor Corporation.

Work Experience

2. I have been working as an engineer and researching and developing new products concerning electric motors and controls for almost 35 years. I have a B.S. in Electrical Engineering and a Masters degree in Engineering Management.

3. From 1983 until 1997 I worked at Philips Technologies or its affiliated entities in Cheshire, Connecticut and The Netherlands. My

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responsibilities included testing stepping motor products, testing on brushless permanent magnet motors, and design and implementation of controllers for BPM motors.

4. From 1997 until 2001 I worked at Nidec America Corporation as a Senior Development Engineer. While at Nidec America I developed motors for disk drives and analyzed a magnetic design for BPM motors for the industrial control industry.

5. From July 2001 until October 2010 I worked at Emerson Electric Co. (“Emerson”) in St. Louis, Missouri in Emerson’s motors and controls division. Nidec Corporation acquired Emerson’s motors and controls division in the fall of 2010, which later became Nidec Motor Corporation. While at Emerson and then at Nidec Motor Corporation, I have worked in St. Louis, Missouri and had various job titles and had numerous job responsibilities. For instance, at Nidec Motor Corporation, from October 2010 until the present, I was first a Director of New Product Development and now am Vice President of New Product Development. While at Nidec Motor Corporation, I have managed many engineers and have had substantial involvement in the research, development, and implementation of electric motors and controls intended for use in the HVAC market. I will refer to

Emerson and Nidec Motor Corporation collectively as “Nidec” in this declaration.

6. During my time at Nidec, I have gained extensive experience designing and developing various electric motors and controls for electric motors, including motor controls like those described and claimed in the '349 patent. As a co-inventor of the '349 patent, I know about HVAC system design and constituent components that are described and claimed in the '349 patent. I am also knowledgeable about commercial embodiments of the subject matter described and claimed in the '349 patent by Nidec.

7. Beginning in 2003 I became a program manager at Nidec and participated in meetings with all tier 1 and tier 2 HVAC customers. Tier 1 customers are those who have the highest volume, and tier 2 have lower volume purchases. I have consistently participated since 2003 in meetings to sell our ECM products to all potential major customers.

8. I am making this declaration to describe the development of the subject matter described and claimed in the '349 patent, the commercial benefits attributable to the subject matter claimed in the '349 patent, and the associated commercial success Nidec realized as a result of the invention claimed in the '349 patent.

The Market for Electric Motors And Features Desired by Customers

9. Through my work experience described above, I have gained significant experience researching, designing, and marketing electric motors and motor controls. Nidec markets and sells its variable speed electric motors and controls to the original equipment manufacturer (“OEM”) HVAC market and through several large distributors who sell into the aftermarket. The OEM HVAC market includes well-known companies like Trane, Goodman, JCI, Rheem, Lennox, Carrier and others. These OEM customers install and service full HVAC systems to businesses and homeowners across the globe.

10. The OEM HVAC market for variable speed electric motors and controls is highly price sensitive and feature driven. The market is highly price sensitive because OEMs require substantial volumes of electric motors and controls, so costs can quickly accumulate with volume purchases that are necessary for OEMs to service their respective markets. Moreover, end-consumers—the businesses and homeowners—that purchase and require service of their HVAC systems are incredibly price sensitive and want inexpensive units that will effectively and efficiently condition their work and living spaces.

11. Additionally, OEMs desire feature-rich motors and controllers that

can be used in many different environments and circumstances. OEMs want to easily incorporate electric motors and controllers into their systems to minimize any engineering or other requirements that may increase their costs to end consumers.

12. The most important features of variable speed HVAC motors and controls are:

- a. Constant Airflow Leading to Improved Comfort and Efficiency of the HVAC System: An HVAC's job is to condition the air in a work or living space. Conditioning air requires the air to move across elements of the HVAC to remove or add heat to the air, which is then recirculated through the work or living space to maintain a desired temperature and/or humidity level. The ability to accurately and efficiently control the flow of air with a variable speed electric motor over the HVAC heat exchanger is of paramount importance. Accordingly accurately and easily controlling the flow rate of air—measured in cubic feet per minute (“CFM”)—is vitally important for an electric motor in an HVAC system to assure consistent conditioning and comfort to the consumer. Constant CFM also improves the life of the heat exchanger and A-coil of the system.

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