

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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APPLE INC.,  
Petitioner,

v.

ANDREA ELECTRONICS CORP.,  
Patent Owner.

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Case IPR2017-00626  
Patent 6,363,345 B1

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Before STEPHEN C. SIU, MICHAEL R. ZECHER, and  
JEREMY M. PLENZLER, *Administrative Patent Judges*.

PLENZLER, *Administrative Patent Judge*.

FINAL WRITTEN DECISION  
*Inter Partes* Review  
35 U.S.C. § 318 and 37 C.F.R. § 42.73

## I. INTRODUCTION

We have jurisdiction to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Apple Inc. (“Petitioner”) has shown by a preponderance of the evidence that claims 1–3, 12–25, 38, and 47 of U.S. Patent No. 6,363,345 B1 (Ex. 1001, “the ’345 patent”) are unpatentable, but has failed to establish that claims 4–11 and 39–46 of the ’345 patent are unpatentable.

### A. Background

Petitioner filed a Petition to institute an *inter partes* review of claims 1–25 and 38–47 the ’345 patent. Paper 1 (“Pet.”). Andrea Electronics Corp. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”).

Pursuant to 35 U.S.C. § 314, we instituted trial on all challenged claims, and on all challenges raised in the Petition. *See* Paper 7 (“Dec. to Inst.”), 12–13. After institution of trial, Patent Owner filed a Patent Owner Response (Paper 11, “PO Resp.”), to which Petitioner filed a Reply (Paper 18, “Pet. Reply”).

An oral argument was held on April 25, 2018. A transcript of the oral argument is included in the record. Paper 25 (“Tr.”).

### B. Related Matters

Petitioner and Patent Owner identify a number of proceedings, both in district court and before the Patent Trial and Appeal Board, involving patents related to the ’345 patent, including a district court proceeding specifically directed to the ’345 patent with Petitioner as a party and Case IPR2017-00627, which is directed to the ’345 patent and involves the same

parties as this proceeding. Pet. viii–x; Paper 4, 1. Our final decision in Case IPR2017-00627 issues concurrently herewith.

*C. Asserted Grounds of Unpatentability and Evidence of Record*

Petitioner contends that the challenged claims are unpatentable under 35 U.S.C. §§ 102 and 103 as set forth in the table below (Pet. 2–3, 17–69).

Reference(s)	Basis	Claims Challenged
Hirsch <sup>1</sup>	§ 102	1–3, 12, 13, 21, 23, and 38
Hirsch and Martin <sup>2</sup>	§ 103	4–11, 25, 39–42, and 46
Hirsch and Boll <sup>3</sup>	§ 103	13, 14, 17–21, 23, and 47 <sup>4</sup>
Hirsch, Martin, and Boll	§ 103	43
Hirsch, Boll, and Arslan <sup>5</sup>	§ 103	15, 16, and 24
Hirsch and Uesugi <sup>6</sup>	§ 103	22
Hirsch, Martin, and Uesugi	§ 103	44 and 45

Petitioner provides testimony from Bertrand Hochwald, Ph.D. Ex. 1003; Ex. 1023. Patent Owner provides testimony from Scott C. Douglas, Ph.D. Ex. 2002. Petitioner also provides deposition testimony

<sup>1</sup> H.G. Hirsch & C. Ehrlicher, “*Noise Estimation Techniques for Robust Speech Recognition*,” IEEE 1995 (Ex. 1005, “Hirsch”).

<sup>2</sup> Ranier Martin, “*An Efficient Algorithm to Estimate the Instantaneous SNR of Speech Signals*,” Eurospeech 1993 (Ex. 1006, “Martin”).

<sup>3</sup> Steven F. Boll, “*Suppression of Acoustic Noise in Speech Using Spectral Subtraction*,” IEEE 1979 (Ex. 1009, “Boll”).

<sup>4</sup> Dependent claim 22 is included in this asserted ground of unpatentability in Petitioner’s “Identification of Claims being Challenged (§ 42.104(b))” (Pet. 3) (emphasis omitted), but this claim is not addressed in its substantive analysis (*id.* at 49–52).

<sup>5</sup> U.S. Patent No. 5,706,395, iss. Jan. 6, 1998 (Ex. 1011, “Arslan”).

<sup>6</sup> U.S. Patent No. 5,459,683, iss. Oct. 17, 1995 (Ex. 1015, “Uesugi”).

from Dr. Douglas (Ex. 1026) and Patent Owner provides deposition testimony from Dr. Hochwald (Ex. 2005).

#### *D. The '345 Patent*

The '345 patent “relates to noise cancellation and reduction and, more specifically, to noise cancellation and reduction using spectral subtraction.” Ex. 1001, 1:19–21. The '345 patent explains that its system receives a noise signal and converts that signal to the frequency domain through a Fast Fourier Transform (FFT). *Id.* at 4:50–5:14. Separate thresholds are set for each frequency bin to determine the location of noise elements for each frequency bin separately. *Id.* at 6:10–13. The '345 patent determines the thresholds by setting two minimum values, which are described as a future minimum and a current minimum. *Id.* at 6:23–41.

At predetermined time intervals (e.g., every 5 seconds), the future minimum value is initialized as the value of the current magnitude of the signal. *Id.* at 6:24–28. Over that time interval, and before the next initialization, the future minimum value of each bin is compared with the current magnitude value of the signal. *Id.* If the current magnitude is smaller than the future minimum, the value of the future minimum is replaced with that current magnitude. *Id.* at 6:28–32.

At the start of each time interval, the current minimum is set as the value of the future minimum that was determined over the previous time interval. *Id.* at 6:34–38. The current minimum then follows the minimum value of the signal for the next time interval by comparing its value with the current magnitude value. *Id.* The current minimum value is used by the spectral subtraction process to remove noise from the signal. *Id.* at 6:38–41.

### *E. Illustrative Claims*

As noted above, Petitioner challenges claims 1–25 and 38–47 of the '345 patent. Claims 1 and 38 are independent, with claims 2–25 and 39–47 depending from either claim 1 or 38. Claim 1 is illustrative, and is reproduced below:

1. An apparatus for canceling noise, comprising:
  - an input for inputting an audio signal which includes a noise signal;
  - a frequency spectrum generator for generating the frequency spectrum of said audio signal thereby generating frequency bins of said audio signal; and
  - a threshold detector for setting a threshold for each frequency bin using a noise estimation process and for detecting for each frequency bin whether the magnitude of the frequency bin is less than the corresponding threshold, thereby detecting the position of noise elements for each frequency bin.

Ex. 1001, 9:35–46.

## II. ANALYSIS

### *A. Claim Construction*

“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)). We construe the claims using the broadest reasonable construction in light of the '345 patent Specification. *See* 37 C.F.R. § 42.100(b). Applying that standard, we interpret the claim terms of the '345 patent according to their ordinary and customary meaning in the context of the patent’s written description. *See In re Translogic Tech., Inc.*,

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