UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

ANDREA ELECTRONICS CORP.,
Patent Owner.

IPR2017-00626
Patent 6,363,345 B1

Before MICHAEL R. ZECHER, JEREMY M. PLENZLER, and
MIRIAM L. QUINN, *Administrative Patent Judges.*

PLENZLER, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision on Remand
Determining Challenged Claims 6–9 Are Unpatentable
35 U.S.C. §§ 144, 318(a)

I.   INTRODUCTION

A.   *Background and Summary*

Apple Inc. ("Petitioner") requested *inter partes* review of claims 1–25 and 38–47 of U.S. Patent No. 6,363,345 B1 (Ex. 1001, "the '345 patent").

Paper 1 ("Pet."). We issued a Decision instituting *inter partes* review. Paper 7 ("Inst. Dec.").

After institution of trial, Andrea Electronics Corp. ("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.

Our Final Written Decision was issued on July 12, 2018. Paper 28 ("Original Decision"). The Original Decision determined that Petitioner had established unpatentability of claims 1–3, 12–25, 38, and 47 of the '345 patent, but had not established unpatentability of claims 4–11 and 39–46 of the '345 patent. Original Decision 24.

On appeal, the U.S. Court of Appeals for the Federal Circuit vacated our Original Decision only as to claims 6–9 of the '345 patent and remanded the case for further proceedings. *Apple Inc. v. Andrea Elecs. Corp.*, 949 F.3d 697 (Fed. Cir. 2020). After conferring with the parties, we permitted additional briefing addressing the issues on remand from the Federal Circuit. Paper 36. Petitioner and Patent Owner simultaneously filed opening briefs (Paper 41 ("Pet. Remand Br."); Paper 42 ("PO Remand Br.")), followed by simultaneously filed Reply Briefs (Paper 44 ("Pet. Remand Reply"); Paper 43 ("PO Remand Reply")). After further conferring with the parties, we authorized an additional round of briefing (Paper 45), which was filed to address claim 9 of the '345 patent. Paper 46 ("Pet. Remand Sur-Reply"); Paper 49 ("PO Remand Sur-Reply").

This is a Final Written Decision on Remand only as to the patentability of challenged claims 6–9. For the reasons discussed below, we

determine that Petitioner has shown by a preponderance of the evidence that these challenged claims are unpatentable.

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 IPR2017-00627, which also is directed to the '345 patent and involves the same parties as this proceeding. Pet. viii–x; Paper 4, 1. Our Final Written Decision in IPR2017-00627 was affirmed by the Federal Circuit. *Apple*, 949 F.3d at 710.

C. 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.

D. Illustrative Claims[1]

Claims 1, 4, 5, 6, and 9 of the '345 patent are illustrative for this Decision on Remand and are reproduced below:[2]

> 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

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[1] The broadest reasonable interpretation was applied in construing claim terms of the '345 patent in the Original Decision. Inst. Dec. 5–6. The '345 patent is now expired. The Federal Circuit made clear that, "[w]hen th[e] court reviews the claim construction of a patent claim term in an IPR appeal after the patent has expired, such as in this case, we apply the standard established in *Phillips*, not the 'broadest reasonable interpretation.'" *Apple*, 949 F.3d at 707 (citations omitted). Neither Patent Owner nor Petitioner allege in any way that the claim construction standard applied would affect the outcome in this remand decision. Any difference in claim construction standard does not affect the outcome of this proceeding.
[2] We include claims 1, 4, and 5 because claims 6 and 9 ultimately depend from claim 5, which depends from claim 4, which depends from claim 1.

bin is less than the corresponding threshold, thereby detecting the position of noise elements for each frequency bin.

Ex. 1001, 9:35–46.

4.   The apparatus according to claim 1, wherein said threshold detector sets the threshold for each frequency bin in accordance with a current minimum value of the magnitude of the corresponding frequency bin; said current minimum value being derived in accordance with a future minimum value of the magnitude of the corresponding frequency bin.

Id. at 9:54–60.

5.   The apparatus according to claim 4, wherein said future minimum value is determined as the minimum value of the magnitude of the corresponding frequency bin within a predetermined period of time.

Id. at 9:61–64.

6.   The apparatus according to claim 5, wherein said current minimum value is set to said future minimum value periodically.

Id. at 9:65–66.

9.   The apparatus according to claim 5, wherein said future minimum value is set to a current magnitude value periodically; said current-magnitude value being the value of the magnitude of the corresponding frequency bin.

Id. at 10:9–12.

   E.   *Prior Art and Asserted Grounds Relevant to Remand*

Petitioner asserts that claims 6–9 would have been unpatentable on the following ground:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
6–9	103	Hirsch[3], Martin[4]

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[3] H.G. Hirsch & C. Ehrlicher, "*Noise Estimation Techniques for Robust Speech Recognition*," IEEE 1995 (Ex. 1005, "Hirsch").
[4] Ranier Martin, "*An Efficient Algorithm to Estimate the Instantaneous SNR of Speech Signals*," Eurospeech 1993 (Ex. 1006, "Martin").

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