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.

COREPHOTONICS, LTD.,
Patent Owner.

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IPR2018-01133
Patent 9,538,152 B2

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Before MARC S. HOFF, BRYAN F. MOORE, and MONICA S.
ULLAGADDI, *Administrative Patent Judges.*

MOORE, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I.   INTRODUCTION

A.   Background and Summary

In this inter partes review, instituted pursuant to 35 U.S.C. § 314,

Apple Inc. ("Petitioner") challenge the patentability of claims 1–4 of U.S.

Patent No. 9,538,152 B2 ("the '152 patent," Ex. 1001), owned by

Corephotonics, Ltd. Paper 2 ("Pet."). We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73, addresses issues and arguments raised during trial. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–4 of the '152 patent are unpatentable.

B. Procedural History

On May 22, 2018, Petitioner filed a petition requesting an *inter partes* review of claims 1–4 of the '152 patent pursuant to 35 U.S.C. §§ 311 *et seq.* Paper 2 ("Pet."). Petitioner relies on the testimony of Dr. Oliver Cossairt. Ex. 1004. Patent Owner did not file a preliminary response.

On December 4, 2018, we instituted an inter partes review of the challenged claims. Paper 8 ("Decision on Institution" or "Dec. on Inst."). On March 28, 2019, Patent Owner filed a Corrected Patent Owner Response. Paper 15. Petitioner relies on the testimony of Dr. James Kosmach. Ex. 2005. Ex. 2005. On June 3, 2019, Petitioner filed a Reply. Paper 19 ("Reply"). A hearing was held on October 8, 2019. A transcript of the hearing has been entered into the record. Paper 32 ("Tr.").

C. Real Parties in Interest

Petitioner indicates that Apple Inc. is the only real party in interest. Pet. 1. Patent Owner does not contest this indication.

D. Related Matters

A decision in this proceeding could affect or be affected by the following case pending in the United States District Court for the Northern District of California and involving the '152 patent: *Corephotonics, Ltd. v. Apple Inc.*, Case No. 5-17-cv-06457 (N.D. Cal.). Pet. 2; Paper 4, 2 (Patent Owner also asserts *Corephotonics, Ltd. v. Apple Inc.*, Case No. 5:18-cv-

02555 (N.D. Cal.) may affect, or be affected by, a decision in this proceeding).

E. The '152 Patent

The '152 patent is directed to "multi-aperture imaging ('MAI') systems with high color resolution and/or optical zoom." Ex. 1001, 1:15–18. The '152 patent states that while mechanical zoom solutions are common in digital still cameras, they are "typically too thick for most camera phones" and may result in "resolution compromise." *Id*. at 1:35–43. In its background, the '152 patent states that one of the known approaches is using a multi-aperture imaging ("MAI") system, for example, a dual-aperture imaging system ("DAI") including "two optical apertures which may be formed by one or two optical modules, and one or two image sensors" for "implementing zoom, as well as increasing the output resolution." *Id*. at 1:52–59.

The Specification states that those known multi-aperture imaging systems "often trade-off functionalities and properties, for example zoom and color resolution, or image resolution and quality for camera module height," and therefore, there was a need to have thin multi-aperture imaging systems that "produce an image with high resolution (and specifically high color resolution) together with zoom functionality." *Id*. at 1:63–66, 1:67–2:3.

As a solution to this problem, the'152 patent describes a dual aperture imaging system including a Wide sensor and a Tele sensor capturing a Wide image and a Tele image from two apertures, where color filter arrays may be used in the Wide sensor and Tele sensor. *Id*. at 2:34–65. The Wide image and Tele image may be fused to "output one fused (combined) output zoom

image processed according to a user [zoom factor] ZF input request." *Id.* at 3:17–20.

The '152 patent describes a dual-aperture zoom imaging system 100 including a Wide subset 104 and a Tele subset 106 each having a respective sensor. *Id.* at Figs. 1A, 1B. The '152 patent explains that a processor 108 "fuses . . . a Wide image obtained with the Wide subset and a Tele image obtained with the Tele subset, into a single fused output image according to a user-defined 'applied' ZF input or request." *Id.* at 5:60–6:2. The '152 patent explains that an overlap area 110 of the Wide image and Tele image is illustrated on the Wide image in the figure. *Id.* at 4:62–64, 6:2–9.

To obtain the output image, the '152 patent teaches a registration process, which "chooses either the Wide image or the Tele image to be a primary image . . . based on the ZF chosen for the output image." *Id.* at 9:20–21, 31–33. The registration process "considers the primary image as the baseline image and registers the overlap area in an auxiliary image to it," and the "output image point of view is determined according to the primary image point of view (camera angle)." *Id.* at 9:20–28.

F. Illustrative Claims

Independent claim 1, reproduced below, is illustrative of the claimed subject matter:

1.   A multi-aperture imaging system comprising:

a first camera that provides a first image, the first camera having a first field of view (FOV_1) and a first sensor with a first plurality of sensor pixels covered at least in part with a standard color filter array (CFA);

a second camera that provides a second image, the second camera having a second field of view (FOV_2) such that $FOV_2 < FOV_1$ and a second sensor with a second plurality of

sensor pixels being either Clear or covered with a standard CFA, the second image having an overlap area with the first image; and

a processor configured to provide an output image from a point of view of the first camera based on a zoom factor (ZF) input that defines a respective field of view (FOV_{ZF}), the first image being a primary image and the second image being a non-primary image, wherein if $FOV_2 < FOV_{ZF} < FOV_1$ then the point of view of the output image is that of the first camera, the processor further configured to register the overlap area of the second image as a non-primary image to the first image as primary image to obtain the output image.

Ex. 1001, 12:60–13:13.

G. Evidence

Petitioner relies on the following references. Pet. 14–27.

Name	Reference	Exhibit
Border	US Patent Application Pub. No. 2008/0030592 A1, filed Aug. 1, 2006, published Feb. 7, 2008.	1006
Parulski	US Patent No. 7,859,588 B2, filed Mar. 9, 2007, issued Dec. 28, 2010	1007

H. Prior Art and Asserted Grounds

Petitioner asserts that claims 1–4 would have been unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–4	103	Border and Parulski

Pet. 12.

II. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject

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