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Paper 41
Entered: September 15, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SATCO PRODUCTS, INC.,
Petitioner,

v.

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA,
Patent Owner.

IPR2020-00579
Patent 7,781,789 B2

Before JENNIFER S. BISK, CHRISTOPHER L. CRUMBLEY, and STEVEN M. AMUNDSON, *Administrative Patent Judges*.

CRUMBLEY, *Administrative Patent Judge*.

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

I. INTRODUCTION

Satco Products, Inc. ("Petitioner"), filed a Petition requesting an *inter partes* review of claims 1, 3, 5, 9, 12, 13, 15, 18, 28, 29, 31, 33, 37, 40, 41, 43, 47, and 56 of U.S. Patent No. 7,781,789 B2 (Ex. 1001, "the '789 patent"). Paper 1 ("Pet"). The owner of the '789 patent, The Regents of the University of California ("Patent Owner"), filed a Preliminary Response. Paper 7 ("Prelim. Resp.").

We instituted review on September 16, 2020. Paper 8 ("Institution Dec."). Subsequent to institution, Patent Owner filed a Patent Owner Response (Paper 16 ("PO Resp.")), Petitioner filed a Reply (Paper 21 ("Reply")), and Patent Owner filed a Sur-Reply (Paper 28 ("Sur-Reply")). A transcript of the oral hearing held on June 14, 2021, has been entered into the record as Paper 36 ("Tr.").

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons that follow, Petitioner has demonstrated by a preponderance of the evidence that the challenged claims are unpatentable.

II. BACKGROUND

A. Related Matters

The parties identify several related district court cases, including *Satco Products, Inc. v. The Regents of the University of California*, 2:19-cv-06444, in the Eastern District of New York ("the Satco Litigation"). Pet. 1–2; Paper 3, 2. In the Satco Litigation, Petitioner filed a complaint seeking a declaratory judgment of non-infringement. Pet. 4. In addition, there are several other pending petitions for IPR challenging patents related to the '789 patent, including IPR2020-00695, IPR2020-00780, IPR2020-00813, IPR2021-00661, IPR2021-00662, and IPR2021-00794.

B. The '789 patent

The '789 patent, entitled "Transparent Mirrorless Light Emitting Diode," describes an "(Al, Ga, In)N light emitting diode (LED) in which multi-directional light can be extracted from one or more surfaces of the LED." Ex. 1001, 5:15–17. In particular, the '789 patent discloses that "[i]n conventional LEDs, in order to increase the light output power from the front side of the LED, the emitting light is reflected by the mirror on the backside of the sapphire substrate or the mirror coating on the lead frame." *Id.* at 6:31–34. Because the energy of the photons in the emitted light is close to the band-gap energy of the emitting layer of the LED, reflected light may be re-absorbed by the emitting layer. *Id.* at 6:37–40. This reduces the efficiency and output power of the LED. *Id.* at 6:40–42. To increase efficiency of the LED, the '789 patent "minimizes internal reflections within the LED by eliminating mirrors and/or mirrored surfaces, in order to minimize re-absorption of the LED's light." *Id.* at 5:36–38. To achieve this, all layers of the LED, except the emitting layer, may be transparent for the emission wavelength of the LED. *Id*. at 5:34–35.

Figures 4A and 4B of the '789 patent are reproduced below.

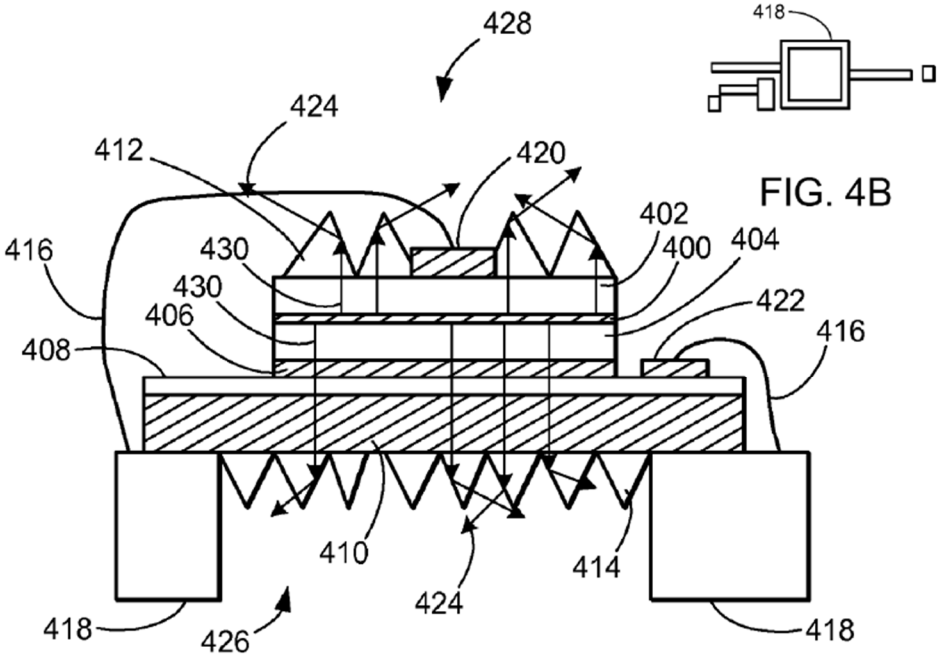

FIG. 4B

FIG. 4A

Figures 4A and 4B of the '789 patent are schematic illustrations of an LED that emits light from multiple sides of the LED as described in the patent. *Id.* at 7:15–19. The LED chip comprises emitting layer 400, n-type GaN layer 402, p-type GaN layer 404, and glass plate 410. *Id.* at 7:45–48. "The LED is attached and wire bonded 416 to a lead frame 418 via the LED's bonding pads 420, 422." *Id.* at 7:50–51. Because lead frame 418 "supports the LED at the edges of the glass 410 leaving the emitting surface of the glass 410 and LED unobstructed," the '789 patent states that the LED "is designed to effectively extract light 424 from both sides of the LED, because the frame 418 does not obstruct the surfaces 412 and 414, i.e., the back side 426 of the LED as well as the front side 428 of the LED." *Id.* at 8:2–9.

C. The Challenged Claims

Petitioner challenges claims 1, 3, 5, 9, 12, 13, 15, 18, 28, 29, 31, 33, 37, 40, 41, 43, 47, and 56 of the '789 patent. Claims 1, 28, 29, and 56 are independent. Claims 1 and 28 are representative:

> 1. An opto-electronic device, comprising:
>
> a light emitting diode (LED) that emits light out of the LED from multiple sides of the LED, wherein all layers of the LED are transparent for an emission wavelength except for an emitting layer.
>
> 28. An opto-electronic device, comprising:
>
> a light emitting diode (LED) that emits light out of the LED from multiple sides of the LED, wherein the LED resides on a transparent plate in a lead frame that allows the light to be extracted from two or more sides of the LED.

Ex. 1001, 14:28–32, 15:40–45.

Claims 29 and 56 are substantively similar to claims 1 and 28, respectively, but claim methods of making the opto-electronic devices of claims 1 and 28. To the extent our analysis herein focuses on claims 1 and 28, it should be understood to apply equally to claims 29 and 56. The parties do not provide separate analyses for the device and method claims.

Claims 3, 5, 9, 12, 13, 15, and 18 depend directly or indirectly from claim 1, while claims 31, 33, 37, 40, 41, 43, and 47 depend from directly or indirectly from claim 29. The additional limitations of the dependent claims are mirrored across each set (i.e., the additional limitations of claims 3 and 31 are the same, claims 5 and 33 are the same, etc.).

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