

Case IPR2024-01312
U.S. Patent No. 11,697,028

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BIOFRONTERA INC., BIOFRONTERA BIOSCIENCE GMBH,
BIOFRONTERA PHARMA GMBH, and BIOFRONTERA AG
Petitioner

v.

SUN PHARMACEUTICAL INDUSTRIES, INC.
Patent Owner

Case IPR2024-01312

U.S. Patent No. 11,697,028

PATENT OWNER'S PRELIMINARY RESPONSE

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<i>Ecolochem, Inc. v. So. Cal. Edison Co.</i> , 227 F. 3d 1361 (Fed. Cir. 2000)	56, 65
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37 C.F.R. § 42.100(b)	23

All emphases are added unless otherwise noted.

PATENT OWNER’S EXHIBIT LIST

EX #	DESCRIPTION
2001	Declaration of Dr. Jose Sasian
2002	<i>Curriculum Vitae</i> of Dr. Jose Sasian
2003	Complainant’s Initial Statement Regarding The Public Interest filed in ITC Investigation No. 337-TA-1411, dated June 25, 2024
2004	Australian Patent Application Publication No. AU 200143869 published September 6, 2001 to Eric Larsen entitled <i>Device and methods for the stimulation of body cells through electromagnetic radiation</i> (“Larsen Publication”)
2005	United States Trademark Serial No. 78214595 Statement of Use and correspondence for BEAUTYLIGHT (“BEAUTYLIGHT”)
2006	United States Patent No. 4,832,294 issued May 23, 1989 to John C. Eldem entitled <i>Portable I.V. Stand</i> (“the ’294 patent”)
2007	Inventor Tom Boyajian LinkedIn profile at https://www.linkedin.com/in/tom-boyajian-404286307/
2008	Inventor Mark Carota LinkedIn profile at https://www.linkedin.com/in/mark-c-366911a/
2009	Inventor Brian Mazejka LinkedIn profile at https://www.linkedin.com/in/brianmazejka/
2010	Lighting-Gallery.net – My lights/completely clear/uncoated Sylvania 28W T5 HE demonstration tube at https://www.lighting-gallery.net/gallery/displayimage.php?album=1601&pos=188&pid=211863
2011	Bourget, C. Michael, <i>An Introduction to Light-emitting Diodes</i> , HortScience, Vol. 43(7), pp. 1944-1946 (December 2008)
2012	United States Patent No. 6,979,101, issued December 27, 2005 to Christian Sauska et al., entitled <i>Fluorescent Lamp Providing Uniform Backlight Illumination for Displays</i> (“the ’101 patent”)
2013	Ndjongue, Alain R. et al., <i>Visible Light Communications (VLC) Technology</i> , pp. 1-23 (June 2015)
2014	Technical Domestic Industry Claim Chart for U.S. Patent No. 11,697,028 (Ex. 10C Public Version) filed in ITC Investigation No. 337-TA-1411, dated July 9, 2024
2015	Declaration of Dr. Heather J Roberts, MD, FAAD
2016	<i>Curriculum Vitae</i> of Dr. Heather J Roberts, MD, FAAD
2017	https://www.levulanhcp.com/

EX #	DESCRIPTION
2018	https://www.levulanhcp.com/how-to-use
2019	https://www.levulanhcp.com/how-it-works
2020	https://www.levulanhcp.com/treatment-landscape
2021	https://www.levulanhcp.com/efficacy
2022	https://www.levulanhcp.com/assets/pdf/levulan-patient-brochure.pdf
2023	https://drheatherroberts.com/procedures-and-treatments/photodynamic-therapy-pdt-for-skin-cancer/
2024	https://www.mydrugrep.com/mobile-campaigns/Levulan V13a 01a/space requirements.html
2025	https://somalaser.com/dr-michael-ehrenreich-md-millburn-dermatologist/
2026	https://somalaser.com/blu-for-acne/
2027	https://somalaser.com/photodynamic-therapy/
2028	https://somalaser.com/photodynamic-therapy-for-actinic-keratoses-and-skin-cancer/
2029	https://somalaser.com/photodynamic-therapy-for-skin-conditions/
2030	https://somalaser.com/skin-conditions/actinic-keratosis/

I. INTRODUCTION

This is the Second Petition filed by Biofrontera challenging the patentability of the revolutionary inventions claimed in U.S. Patent No. 11,697,028 (the “’028 patent”) in the field of photodynamic therapy (PDT). Conventional PDT devices at the time left “optical dead space[s]” near the edges of the device panels, which “reduce[d] the uniformity of the light along the treatment area, thereby reducing the effectiveness of PDT.” EX1001, 2:41-44, 2:52-56. As such, there was a longstanding need for a PDT device that provides uniform illumination and eliminates optical dead spaces. EX1001, 2:30-51. Sun Pharmaceutical Industries, Inc. (“Sun Pharma”) and its many scientists spent decades researching and developing unique technology to aid those suffering from certain skin conditions. EX2003, 1-2, 4. After years of research, Sun Pharma developed a novel five-panel PDT device that provides uniform illumination during PDT treatment without optical dead spaces. *Id.*; EX1001, 2:52-3:21. In particular, the PDT device of the ’028 patent uses hinges “mounted to the inner side surfaces of adjacent panels,” which “reduc[e] the area in which no light source is present on the illuminator.” EX1001, 3:11-21, 4:65-5:1, FIG. 3A. The light sources are arranged on the panels to provide uniform illumination such that those near the shorter edges of the panels “emit a higher intensity of light” than those near the longer edges of the panels. EX1001, 6:18-40, FIG. 5. Sun Pharma’s unique illuminator configuration produces

“light output uniformity” that is “greatly enhanced across the patient’s face and exhibits little to no deviation from the light output measured in the center of the patient’s face to the light output measured at the edges of the patient’s face.” EX1001, 8:43-67, FIG. 8. Sun Pharma became an established and recognized leader in PDT treatments—indeed, its products (Levulan® and BLU-U®) are the “#1-prescribed photodynamic therapy.” EX2017, 1. Sun Pharma’s next-generation device (BLU-U® device Model 4170E) embodies the ’028 patent and received FDA Special Premarket Notification clearance on June 13, 2024. EX2003, 4.

This Petition challenging claims 1, 2, 4-6, 16-17, and 19-21 (the “Challenged Claims”) should be denied.

First, the Board should deny this Petition because Petitioner has not shown why it deserves a second bite at challenging the *same claims* of the *same patent*. Petitioner provides no valid justification for filing a Second Petition—nearly four months after the First Petition—which the Board considered and denied on the merits. IPR2024-00874, Paper 9 (PTAB Nov. 12, 2024). Petitioner’s primary alleged basis for filing the Second Petition was its unilateral decision to change the definition of a POSITA—without any court order to warrant such a change. Even more concerning is that Petitioner fails to articulate how the requirements it added meaningfully changed the patentability analysis of the Challenged Claims for the

prior art at issue. Indeed, Petitioner does not even attempt to justify why its new definition that would exclude every inventor as a POSITA is justified.

Petitioner also alleges that it filed the Second Petition to reduce the burden on the Board and parties by “focus[ing] only on the claims asserted” in litigation. This too rings hollow. Had Petitioner really wanted to reduce the burden they could have requested termination of the First Petition instead of having the Board author a lengthy Institution Decision. This is simply a second bite at the apple under the guise of “Parallel Petition” that should be denied under 35 U.S.C. §316(b). *See* Patent Owner’s Response To Petitioner’s Notice Regarding Parallel Petitions. Indeed, the Second Petition—filed almost four months after the First Petition—is a serial petition, and the *General Plastic* factors overwhelmingly favor denial of this Petition. As discussed below, the Board should exercise its discretion under 35 U.S.C. §314(a) to deny institution. *Apple Inc. v. Koss Corp.*, IPR2021-00679, Paper 14, 14-17 (PTAB Oct. 12, 2021) (“[o]n this additional basis” the Board denied institution of a follow-on petition filed “the day before Patent Owner filed its preliminary response” with a “four month gap” between petitions).

Second, the Petition should be denied on the merits for six reasons:

(1) Petitioner fails to establish a reasonable likelihood of prevailing on Grounds I and II, for independent claims 1, 5, 20, and 21, because Larsen does not disclose or render obvious “hinged structures on ***inner side surfaces of adjacent***

panels.” Petitioner misreads Larsen’s disclosure. Larsen clearly labels the hinges **10** at the **bottom** of the panels, **not** the inner side surfaces. Unable to show express disclosure, Petitioner argues the hinges must **necessarily** be on the inner side surfaces. But Petitioner’s inherency argument also fails because Larsen itself discloses hinges on the **bottom** of the panels, and there were other known panels that were spaced close together and connected by hinges at the **bottom** of the panels. Recognizing that Petitioner’s inherency argument cannot hold water, Petitioner alternatively argues that hinges on inner side surfaces of adjacent panels must be obvious. But the Petition does not provide any objective support for its argument, merely relying on its expert, who simply regurgitates **verbatim** the obviousness argument found in the Petition. Petitioner fails to show even one piece of prior art actually disclosing the claimed hinged structure. Such opinion unsupported by actual underlying evidence is insufficient to support Petitioner’s alleged obviousness. *Xerox Corp. et. al. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 16-18 (Aug. 24, 2022) (precedential). Petitioner thus fails to meet its burden.

(2) Petitioner fails to establish a reasonable likelihood of prevailing on Grounds I and II, for independent claim 16, because Larsen does not disclose “wherein the five panels are **individually configurable to control illumination from each of the five panels.**” Again, Petitioner misreads Larsen’s disclosure. Larsen does not disclose that each of the five applicators is **individually** adjustable to control

illumination from each of the five panels. Rather, Larsen merely discloses that Larsen's device as a whole is adjustable. Specifically, Larsen discloses only *one* control mechanism for the *entire* device as compared to the '028 patent, which discloses that "each panel may have a dedicated control unit to regulate power to the individual LED array on a given panel." None of Larsen's disclosures relied on by Petitioner disclose that "the five panels are individually configurable to control illumination from each of the five panels." Petitioner thus fails to meet its burden.

(3) Petitioner fails to establish a reasonable likelihood of prevailing on Grounds I and II, for independent claim 16, because Petitioner does not show that Larsen discloses or renders obvious "a mobile base supported by *at least four wheels*." As Petitioner's expert admitted, Larsen discloses that "only two wheels are shown in Fig. 1." As such, Petitioner yet again relies on inherency, which is without merit as Larsen does not *necessarily* disclose at least four wheels. For example, many other number of wheels, such as three-wheel designs were possible to provide a stable base. Again recognizing that Petitioner's inherency argument cannot hold water, Petitioner again resorts to an obviousness theory. However, rather than providing any objective support for its argument, Petitioner merely relies on the entirely conclusory opinion of its expert, who simply regurgitates the obviousness argument found in the Petition. Such a conclusory opinion unsupported by actual underlying evidence is insufficient to support Petitioner's alleged

obviousness. *Xerox*, IPR2022-00624, Paper 9, 16-18. Petitioner thus fails to meet its burden.

(4) Petitioner fails to establish a reasonable likelihood of prevailing on Grounds I and II, for all claims, because Petitioner does not show motivation to combine Lundahl and Larsen, and Lundahl, Larsen, and Bansal with a reasonable expectation of success. Regarding Petitioner's alleged motivation to incorporate Larsen's panels into the PDT device of Lundahl: (a) Petitioner fails to explain why a POSITA would have been motivated to solve a problem that Lundahl *already solves*, (b) a POSITA would have been discouraged from modifying Lundahl's U-shaped tubes to incorporate Larsen's panels because of Lundahl's express *criticism* of flat emitting surfaces, and (c) a POSITA would have been led away from modifying Lundahl to incorporate *five* panels because Lundahl's U-shaped reflector that conforms to the configuration of the tubes has *nine* segments. Regarding Petitioner's alleged motivation to modify Lundahl's device to incorporate LEDs as taught by Larsen and Bansal, Petitioner additionally fails to explain how or why a POSITA would have reasonably expected the combinations of fundamentally different systems to work. Petitioner thus fails to meet its burden.

(5) Petitioner fails to establish a reasonable likelihood of prevailing on Ground I, for all claims, because Petitioner has not shown that Lundahl in view of Larsen renders obvious arranging lights sources such that "a higher intensity of light is

emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” Petitioner relies on “the PDT device and light distribution of Lundahl” for this limitation. However, Petitioner fails to read Lundahl as a whole. When properly read as a whole, Lundahl expressly discloses that the output from the U-shaped tubes is “*not inherently uniform*” and there are “*area[s] of reduced emission*” near the cathodes of the U-shaped tubes. Lundahl explains that the “arrangement” of the “plurality of U-shaped tubes 10(1)-10(7)” “allows the cathodes and their *low output area* to be located outside the active emitting area (effectively behind the patient’s ears).” Petitioner’s alleged combination ignores Lundahl’s teaching that the “arrangement” of light sources has “*low output area[s]*” of “*reduced emission.*” Petitioner also fails to read the claim limitation as a whole, which requires that “each of the five panels” has “a higher intensity of light [] emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” A POSITA applying Lundahl’s teaching of light distribution would have understood that some of the panels of the combined device would have had “*low output area[s]*” of “*reduced emission.*” When such “*low output area[s]*” of “*reduced emission*” are properly considered in view of Lundahl’s teachings, Petitioner has not shown that “each of the five panels” in the alleged “resulting device” has light sources arranged such that “a higher intensity of light is emitted proximate the second edges compared to the intensity of

light emitted not proximate the second edges.” Petitioner’s failure to meet its burden with respect to this limitation, which is present in *all* the independent claims, is alone sufficient for the Board to find Petitioner has not met its burden with respect to Ground I.

(6) Petitioner fails to establish a reasonable likelihood of prevailing on Ground II, for all claims, because Petitioner has not shown that Lundahl in view of Larsen and further in view of Bansal renders obvious arranging light sources “such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” The Board *denied institution* of the First Petition, finding “Petitioner has not sufficiently shown for institution that Bansal teaches or suggests arranging light sources ‘such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.’” IPR2024-00874, Paper 9, 17. Here, Petitioner makes the *same arguments regarding Bansal*, and the Board should *find Ground II deficient for the same reason*: The claims *distinguish between first edges and second edges of the panels*. But, as Petitioner and its experts have admitted, “Bansal’s solution provides higher intensity (or density) of lights *around all edges* of the panel.” Bansal does not disclose this limitation because it requires a higher intensity of light emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges, *which includes at least*

the first edges. Petitioner’s failure to meet its burden with respect to this limitation, which is present in *all* the independent claims, is alone sufficient for the Board to find Petitioner has not met its burden with respect to Ground II.

Due to at least these deficiencies, the Petition does not establish “a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Accordingly, Patent Owner respectfully requests denial of institution.

II. BACKGROUND

A. Overview Of The ’028 Patent

The ’028 patent relates to an “adjustable illuminator that provides a uniform distribution of visible light” and “is suitable for use in photodynamic therapy [PDT] and diagnosis.” EX1001, 1:19-22; EX2001, ¶¶44-46.

The ’028 patent addressed the problem of “optical dead space that can occur at or near the hinges of conventional adjustable illuminators,” which “reduces the uniformity of the light along the treatment area, thereby reducing the effectiveness of PDT.” EX1001, 2:41-44; EX2001, ¶47. The illuminator panels of an embodiment of the present invention are “coupled together using nested hinges, thereby reducing the area in which no light source is present on the illuminator” and “the light sources on each of the panels are individually configurable to provide

specific power output to certain areas of the light sources on the panels to compensate for decreased uniformity.” EX1001, 3:11-21; EX2001, ¶48.

As shown below in FIG. 2B, the illuminator “preferably has five individual panels 10a-10e, each of which are connected in a rotatable manner via nested hinges 50.” EX1001, 3:52-56. Each of the five panels contains an array of light emitting diodes (LED) 60, which preferably “extend[] as far to the edges as possible.” EX1001, 3:56-64.

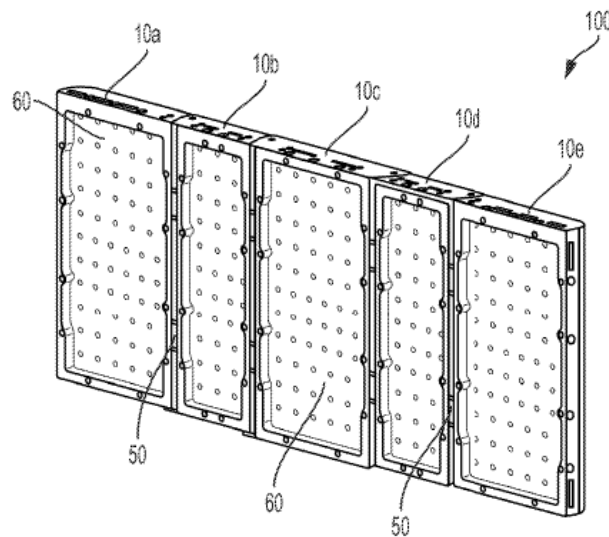


FIG. 2B

EX1001, Fig. 2B; EX2001, ¶49. The “nested hinges 50” (shown in blue) are “mounted to the inner side surfaces of adjacent panels (e.g. 10a, 10b),” as shown in FIG. 3A below. EX1001, 4:65-5:1.

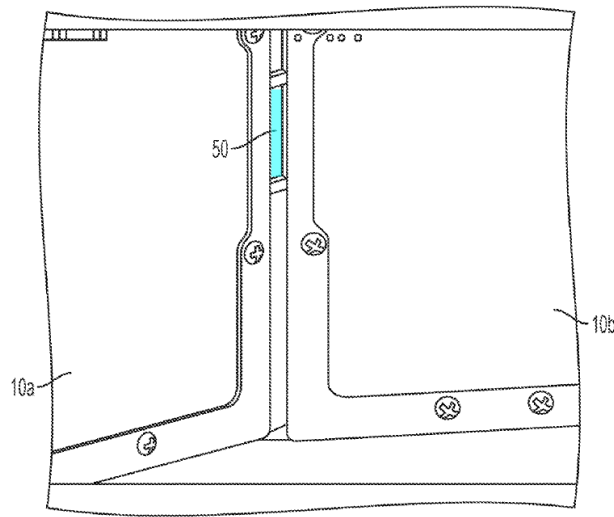


FIG. 3A

EX1001, Fig. 3A; EX2001, ¶50.

As shown in FIG. 5, the LED arrays “are divided into three general areas.” EX1001, 6:24-31. A higher current is supplied to areas 1 and 2 (shown in red) than areas 3 and 4 (shown in yellow) “such that areas 1 and 2 emit a higher intensity of light than areas 3 and 4.” EX1001, 6:32-40.

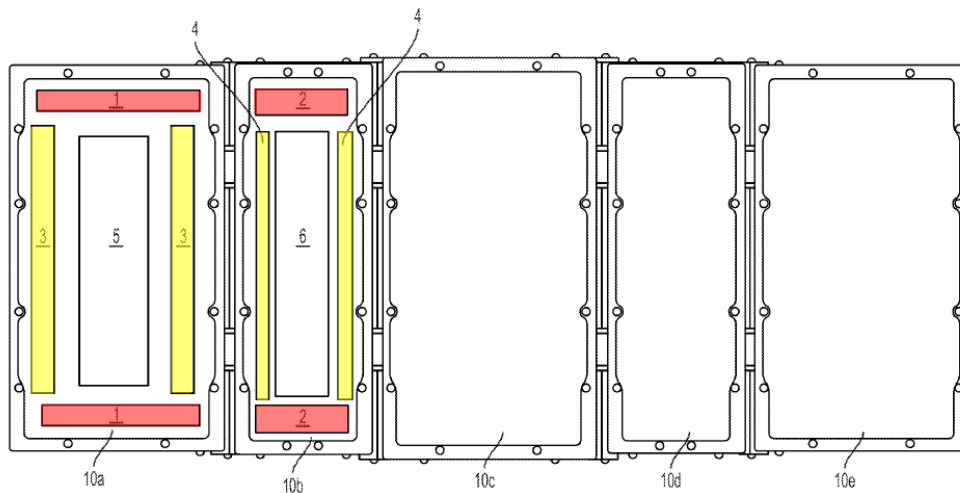


FIG. 5

EX1001, FIG. 5; EX2001, ¶¶51-52.

As shown in FIG. 4, the illuminator's main body 100 with the five LED panels is “mounted to a movable stand 80,” which includes a base 81 and vertical pillar 82. EX1001, 5:15-20. The base has “wheels 87 at its bottom in order to allow the user to horizontally move the illuminator to an appropriate position.” EX1001, 5:21-23; EX 1002, 469 (disclosing “a mobile base supported by at least four wheels”). Each of the five LED panels “may have a dedicated control unit to regulate power to the individual LED array on a given panel.” EX1001, 5:57-62.

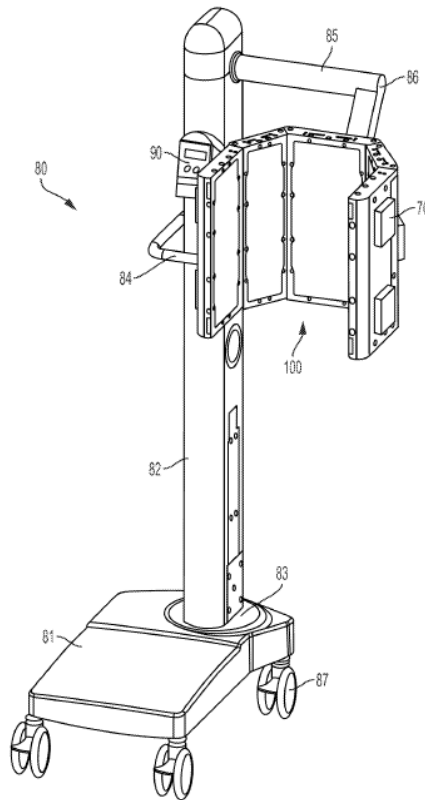


FIG. 4

EX1001, FIG. 4; EX2001, ¶57. The '028 patent discloses that the “light output uniformity” produced by an embodiment of the illuminator of the present invention

is “greatly enhanced across the patient’s face and exhibits little to no deviation from the light output measured in the center of the patient’s face to the light output measured at the edges of the patient’s face” over an operating “distance of two and four inches.” EX1001, 8:43-67 (comparing light uniformity produced by a conventional illuminator in FIG. 7 to the light uniformity produced by an embodiment of the present invention in FIG. 8), FIG. 8. EX2001, ¶¶44-57.

B. Overview Of The ’028 File History

The application that issued as the ’028 patent was filed on September 12, 2022 and claimed priority to a provisional application filed on October 15, 2015.

In an Office Action dated November 18, 2022, the Examiner rejected pending claims 18 and 20-22 as unpatentable over the Larsen ’381 patent (EX1008) in view of Fan (U.S. 2006/0253175). EX1002, 328-330. The Examiner stated that claims 3, 6, 9, and 19 would be allowable if rewritten in independent form. EX1002, 333.

In response, on February 16, 2023, Applicant amended pending claim 18 to recite the subject matter of claim 19: “each of the five panels having two first edges and two second edges shorter than the two first edges, the light sources arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” EX1002, 203-204, 207.

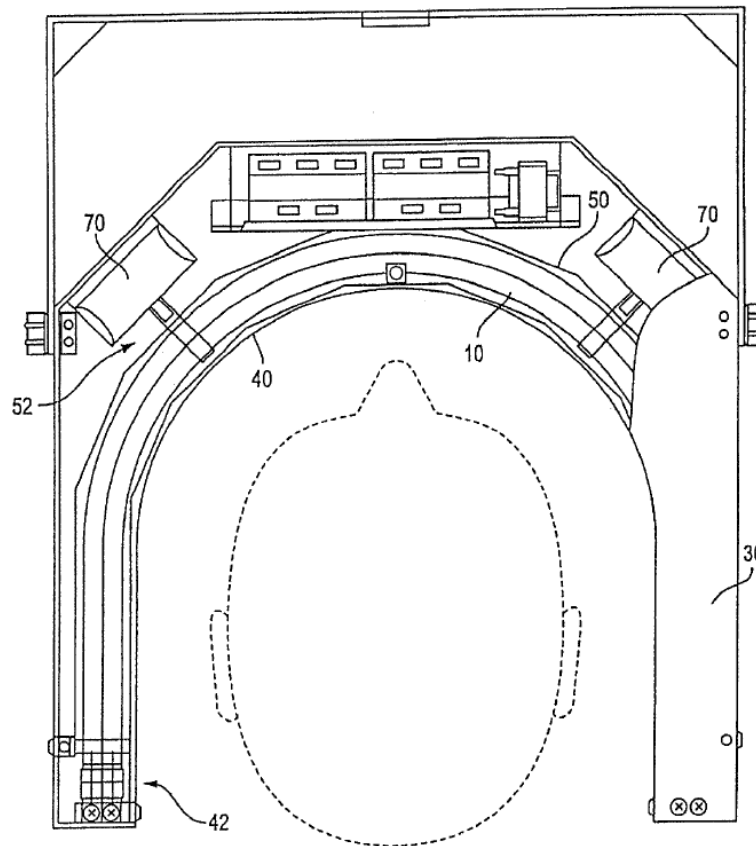
Following the amendment, the Examiner issued a Notice of Allowance on March 1, 2023. EX1002, 114. The Examiner stated in the reasons for allowance that “the art of record neither anticipates nor renders obvious ‘wherein each of the five panels has two first edges and two second edges shorter than the two first edges, and the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges’ in combination with the rest of the claimed limitations set forth in the independent claim.” EX1002, 120. EX2001, ¶¶87-91.

III. OVERVIEW OF THE REFERENCES

A. Lundahl (EX1014)

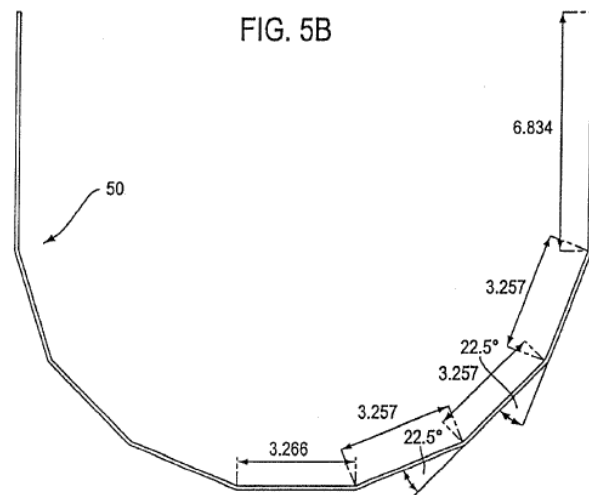
Lundahl discloses “an improved illuminator for PDT and/or PD” “that produces visible light of consistent uniformity in terms of both spectral characteristics and intensity over a diversely contoured surface.” EX1014, 2:33-38. FIG. 1 shows “a partial cross-section, front elevation view of an illuminator according to the present invention.” EX1014, 4:60-61.

FIG. 1



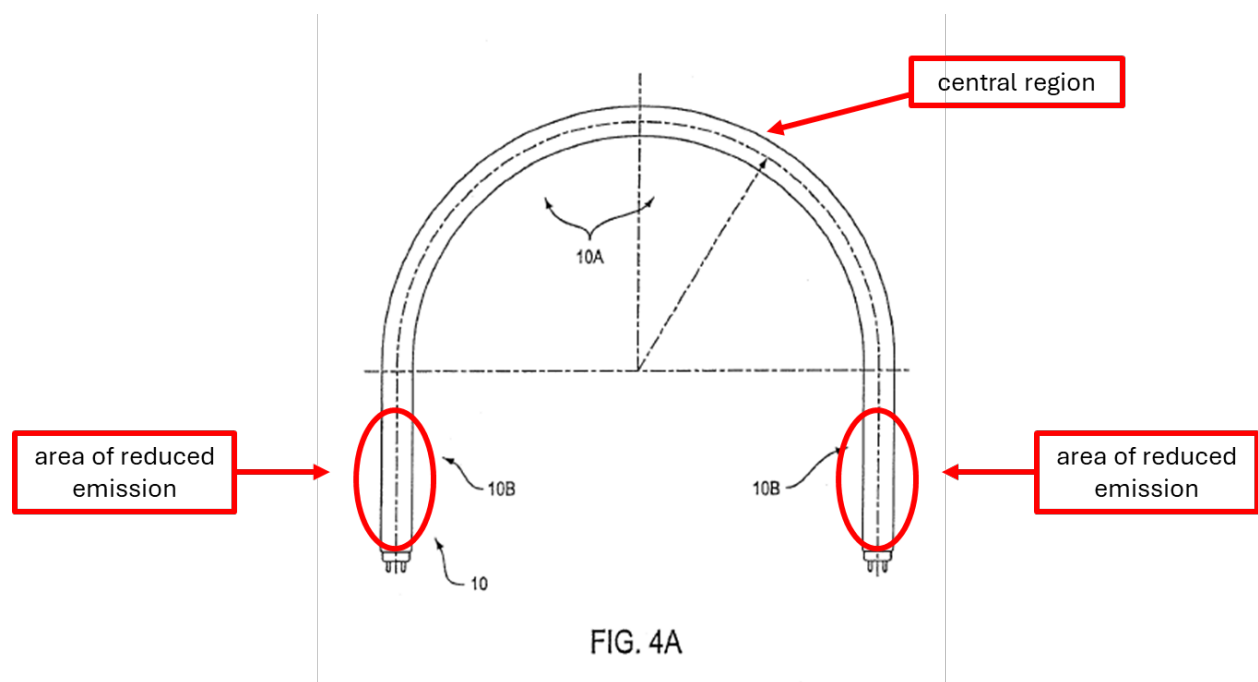
EX1014, FIG. 1. Lundahl discloses an illuminator with a “U-shape” that “provides the desired irradiance and irradiance uniformity for scalp and facial irradiation, and thus ensures that the proper visible light dosage is applied to all target areas during PDT.” EX1014, 6:31-42, 4:33-38. Lundahl also discloses that the invention is “directed to...other areas of the patient (e.g., arms, legs, etc.).” EX1014, 1:14-17.

As shown in Fig. 5B, reflector 50 located behind the fluorescent tubes is “bent to approximately conform to the configuration of the tubes” and “increases both the output irradiance and the uniformity of the output distribution.” EX1014, 5:30-32, 8:65-67.



EX1014, FIG. 5B.

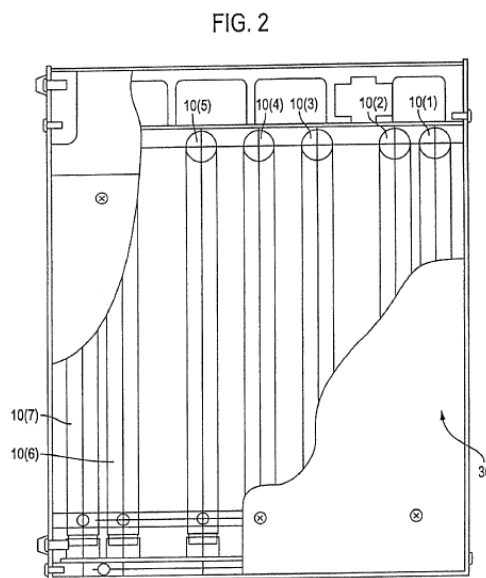
As shown in FIG. 4A, the fluorescent tubes “have a generally arcuate central region 10A and arms 10B extending from respective ends of the central region,” which “produces higher output irradiances than the rest of the tube.” EX1014, 5:43-46, 9:42-54. The tubes have “area[s] of reduced emission” near the cathodes.



EX1014, FIG. 4A, 6:15-16. Lundahl discloses that “[t]he output from a fluorescent tube is not inherently uniform” and “[t]he output measured in the immediate vicinity of the cathode is typically much lower than the output over the rest of the tube.” EX1014, 6:10-16.

Lundahl also discloses that “[t]o avoid uniformity problems, one embodiment of the present invention utilizes a plurality of U-shaped tubes 10(1)-10(7). This arrangement allows the cathodes and their low output area to be located outside the active emitting area (effectively behind the patient’s ears). Only the more uniform center portion of the tube output is used for patient treatment.” EX1014, 6:16-22.

FIG. 2 shows the spacing of fluorescent tubes 10(1)-10(7), which Lundahl explains was “chosen to achieve desired uniformity and power output.” EX1014, 6:43-59.

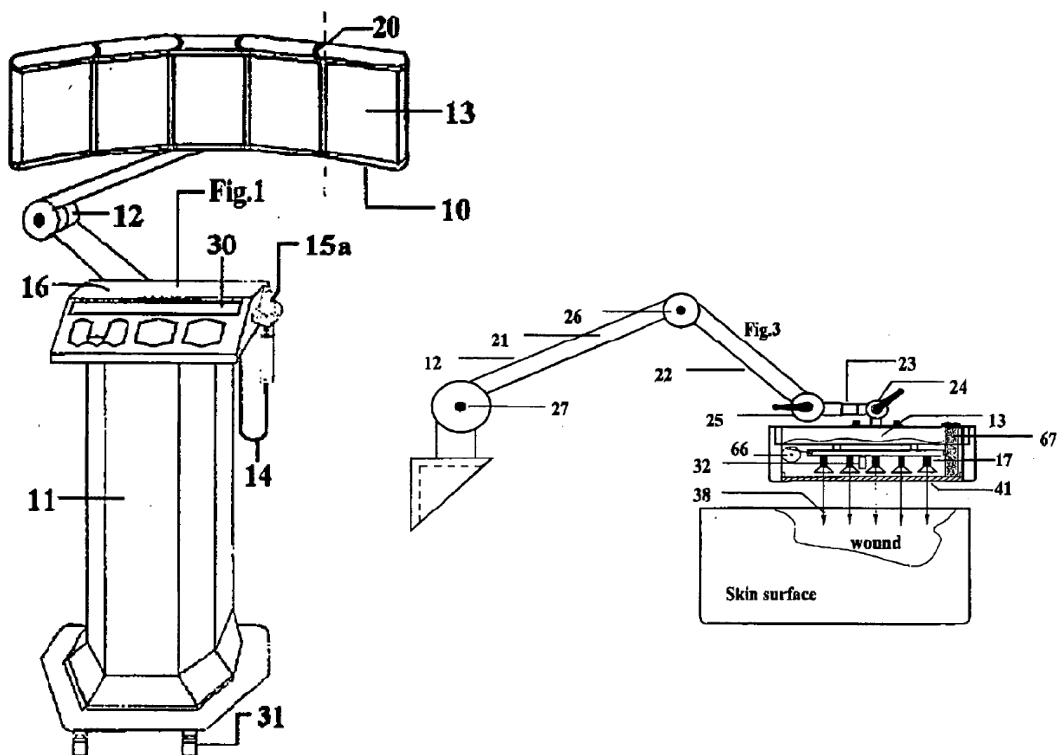


EX1014, FIG. 2. Lundahl discloses that the plurality of light sources are “adapted for irradiating substantially uniform intensity light from said emitting area.” EX1014, 3:32-38. EX2001, ¶¶59-72.

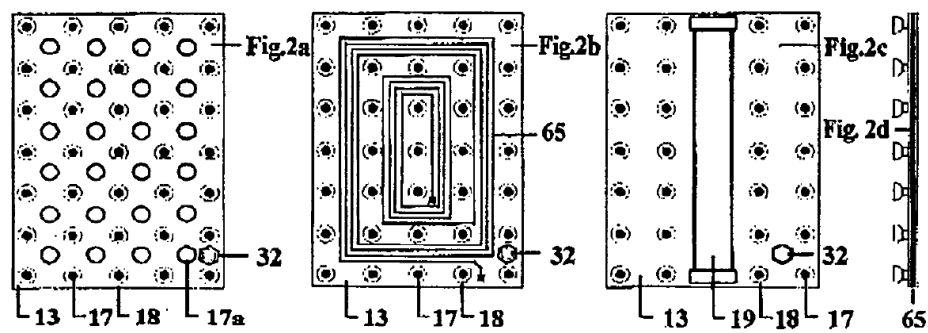
B. Larsen (EX1004)

Larsen discloses a device for photodynamic therapy (PDT) with applicators that are “equipped with an adjustable scan system, which permits an even and gap-free radiation of the surface with the multiple wavelengths of light.” EX1004, [0028].

Figure 1 illustrates the device, “consist[ing] of a stand 11, with which machine applicators 13...are connected through a jointed arm 12.” EX1004, [0069], [0040]. The “applicators 13 are flexibly connected to each other through hinges 10, respectively connecting one edge with the other.” EX1004, [0072], [0027].



EX1004, FIGS. 1, 3. “In each applicator the printed circuit board carrying the light sources is connected to a small electrical scan engine 66, which can move the light sources with linear movements.” EX1004, [0072]. The applicators 13 have printed circuit boards with light sources 17 “placed in regular row arrangements, i.e., 20 equidistant from each other, whereby, according to FIG. 2c, one applicator 13, in addition to the diodes 17, has a light source 19.” EX1004, [0071].



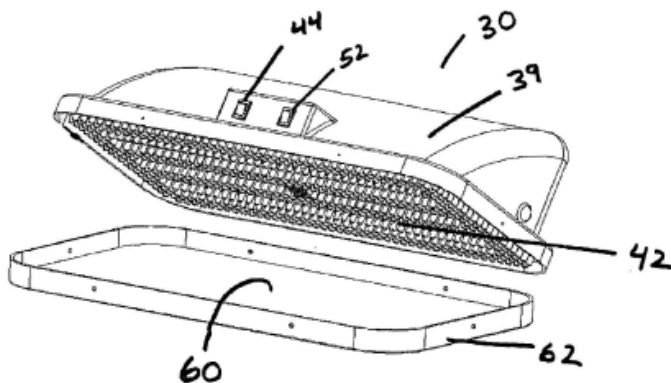
EX1004, FIGS. 2a, 2b, and 2c.

As shown in FIGS. 2a, 2b, and 2c, the applicators 13 “are equipped with sensors 32 arranged between the semiconductor and/or laser diodes 17.” EX1004, [0079]. Larsen discloses that “[w]ith the help of the control mechanism 16, the invented device is adjustable within a relatively large range with reference to duration, amplitude and frequency of surge of current, so that the semiconductor diodes 17, 17a and 18, as well as laser 17 diodes with the same realisation as semiconductor diode 17, can be used as light sources.” EX1004, [0074]. EX2001, ¶¶73-81.

C. Bansal (EX1005)

Bansal discloses a “phototherapy system including a non-uniform array of light sources.” EX1005, [0010]; EX2001, ¶83. Shown below in Figure 2, Bansal’s device has an enclosure 30 that supports the LED board 42. EX1005, [0023], [0012].

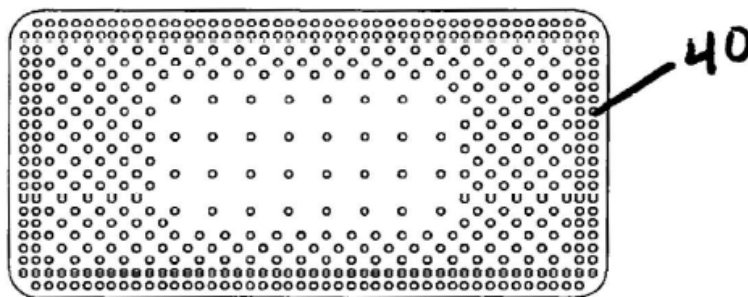
Fig. 2



EX1005, FIG. 2. Bansal also has “a light diffusing panel 60 placed between the array 40 and a subject.” EX1005, [0021].

Bansal discloses that the array of light sources “can take a number of different non-uniform forms to achieve the goal of even exposure on the subject's skin.” EX1005, [0025]. In one embodiment, “the density of light source distribution would vary throughout the array, such as with higher density in the periphery and a lower density in the center. In yet another version of the invention, low intensity light sources could be used in one portion of the array, and higher intensity light sources could be used in another section. This can be achieved by either using different intensity light sources or driving the light sources with a lower power in the center and a higher power on the outer edges....Some exemplary light source configurations are provided in FIGS. 9a-9d.” *Id.* Fig. 9b of Bansal is shown below.

Fig. 9b



EX1005, FIG. 9b.

Bansal further discloses that PDT devices with light sources arranged in “uniform arrays” that are “suspended 12 inches above a subject” can “produce sufficient intensity...to be a clinically useful phototherapy device.” EX1005, [0007]. EX2001, ¶¶82-86.

IV. THE LEVEL OF ORDINARY SKILL IN THE ART

A person of ordinary skill in the art (“POSITA”) at the time of the invention of the ’028 patent would have had a M.D. and/or a Ph.D. in an electrical engineering, physics, optical sciences, optical engineering, or a related scientific or engineering field, and at least one to two years of work or research experience in optical engineering, optics, optoelectronics, phototherapy (“PT”), PDT, or a related field. Alternatively, a POSITA could have a Bachelor’s degree in one of the above areas and at least three to four years of work or research experience in that area. EX2001, ¶¶29-30.

Petitioner’s definition of a POSITA in this Second Petition differs from Patent Owner’s definition and Petitioner’s *own* definition in the First Petition on the *same claims and prior art*. Petition, 23-24; IPR2024-00874, Paper 1, 8 (citing EX1003, ¶37). Unlike Petitioner’s definition in the First Petition, where a POSITA would have had an engineering degree, Petitioner’s *new definition* requires an engineering degree *and* a medical degree or at least four years of medical experience. Petition, 23-24. As discussed in Patent Owner’s Response To Notice Regarding Parallel Petitions, Petitioner provides no valid justification for changing its definition, which would exclude the inventors as POSITAs on their own patents—as none of the inventors has a medical degree or at least four years of medical experience. *See, e.g., Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (*en banc*)

(referring to “the well-settled understanding that inventors are typically persons skilled in the field of the invention”); *Byrne v. Wood, Herron & Evans, LLP*, 450 F. App’x 956, 964 (Fed. Cir. 2011); EX2007-EX2009. Petitioner fails to articulate how the requirements it added meaningfully changed the patentability analysis of the challenged claims for the prior art at issue. Indeed, Petitioner relied on an expert in the First Petition who is an engineer, and **not** a medical doctor. IPR2024-00874, EX1003, ¶¶7, 28 (Petitioner’s engineering expert, Dr. Bretschneider, alleging he has “a sound basis for opining how persons of ordinary skill in the art at that time would understand the claim terms and technical issues in this case”); *see also* EX1015, ¶118 (Dr. Grove characterizing his own expertise as “engineering expertise”).¹

Nevertheless, to the extent that the parties’ proposed definitions differ, the Board does not need to resolve those differences to deny institution, as the Petition is deficient under either party’s proposed definition. EX2001, ¶¶31-32.

V. CLAIM CONSTRUCTION

Claim terms in IPRs are construed according to their “ordinary and customary meaning” to those of skill in the art. 37 C.F.R. § 42.100(b); *see also Phillips*, 415

¹ While Dr. Grove cites the declaration of Michael Ehrenreich, M.D. for alleged motivation to combine, neither Petitioner nor Dr. Grove relies on Dr. Ehrenreich for mapping any claim limitations discussed below in Sections VII.A.1, 2, 3, 5 and 6.

F.3d at 1312-13. Patent Owner submits that the Board need not construe any terms to deny institution. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).²

VI. THE PETITION SHOULD BE DISCRETIONARILY DENIED UNDER *GENERAL PLASTIC*

Although Biofrontera refers to its two petitions challenging the '028 patent as “parallel” petitions, they are anything but. The circumstances of the filings, including the timing and the content, illustrate that the Second Petition is the type of “serial” petition that should be denied under *General Plastic Industrial Co. v. Canon Kabushiki Kaisha*. IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017) (precedential); *Apple v. Koss*, IPR2021-00679, Paper 14, at 14-17; PTAB Multiple Petitions Study, July 2023, at 3 (explaining that a “serial petition” is a “petition filed more than 90 days after the first petition filed by the same petitioner challenging the same patent”).

Biofrontera filed its Second Petition on August 21, 2024, almost *four months* after filing its First Petition (IPR2024-00874) on April 30, 2024. Despite the Second Petition being filed prior to the Preliminary Response in the first proceeding, this nearly four-month delay allowed Biofrontera to morph its positions in view of Patent

² Patent Owner reserves the right to raise other/additional claim construction arguments in any other/parallel proceedings.

Owner's infringement contentions and claim mappings. Those documents detailed Patent Owner's analyses of the '028 patent claims. *See, e.g.*, EX1019; EX2014. Biofrontera advantageously used the information to prepare a Second Petition in view of Patent Owner's contentions. *See, e.g.*, Petition, 7, 12 (referencing EX1019). This road mapping strategy "imposes inequities" on Patent Owner and is not permitted under *General Plastic*. *General Plastic*, 11 ("[t]he filing of sequential attacks against the same claims, with the opportunity to morph positions along the way, imposes inequities on [Patent Owner]") (quoting original Institution Decision).

Biofrontera provides no reason why it needs ***additional*** backup grounds of the same type in the Second Petition. Biofrontera's Second Petition creates an unfair additional burden on the Board and Patent Owner and should be denied under *General Plastic*, as illustrated by the factors below.

A. Factor 1: The same Petitioner previously filed a petition directed to the same claims of the '028 Patent.

Biofrontera's First and Second Petitions both challenge claims 1-2, 4-6, 16, 17, and 19-21 of the '028 patent.

This factor therefore heavily favors denial.

B. Factor 2: At the time of the filing of the First Petition, Petitioner knew of the prior art asserted in the Second Petition.

Biofrontera indisputably knew of the prior art asserted in the Second Petition at the time of the filing of the First Petition. Larsen and Bansal are asserted in both

the First and Second Petitions, with large swaths of the Petitions word-for-word identical. Lundahl is cited in the background of the '028 patent (EX1001, 1:53-54), and Petitioner *admits* it submitted the “substantively similar” Lundahl WO 99/56827 with the First Petition. Petition, 17-18.

Accordingly, this factor also heavily favors denial.

C. Factor 3: Whether at the time of filing of the Second Petition the Petitioner already received Patent Owner’s Preliminary Response to the First Petition or received the Board’s decision on whether to institute review of the First Petition.

Although Biofrontera filed the Second Petition one day before Patent Owner filed its Preliminary Response, this factor nevertheless favors denial. When Biofrontera filed the Second Petition, it had already learned of Patent Owner’s infringement contentions and claim mappings and morphed its prior art combinations in view of such information—thus engaging in the sort of road mapping prohibited by *General Plastic*. See *General Plastic*, 17.

On June 25, 2024, two months prior to the Second Petition, Patent Owner served its infringement claim charts. EX1019. Patent Owner’s infringement claim charts explained, for example, that the LEDs in the accused device were “distributed on each panel in a specific way (see Figure 1), such that they are more densely packed towards the upper and lower edges.” EX1019, 15-16. Patent Owner also

served claim mappings regarding its own device two months prior to the Second Petition. EX2014.

Accordingly, when Biofrontera filed its Second Petition, it already had knowledge of Patent Owner’s infringement positions and claim mappings. This is the specific situation addressed by Factor 3, which questions whether a petitioner is “in a position to gain a benefit from having that information before filing its second petition.” *Apple Inc. v. Uniloc 2017 LLC*, IPR2020-00854, Paper 9, 10 (Oct. 28, 2020) (precedential). Here, Biofrontera was undoubtably in a position to gain a benefit—and in fact did gain a benefit—from this information. It was able to present the combination of references in the Second Petition as allegedly resembling assertions regarding the accused device. *Compare* EX1015, ¶178 (annotated figure) *with* EX1019, 16 (figure).

This factor strongly favors denial because Biofrontera’s road mapping strategy is “unfair” and “an inefficient use of the *inter partes* review process.” *See General Plastic*, 17-18 (holding that it is unfair to “allow petitioners the opportunity to strategically stage their prior art and arguments in multiple petitions...until a ground is found that results in the grant of review”).

D. Factor 4: The Length of Time that Elapsed Between the Time the Petitioner Learned of the Prior Art Asserted in the Second Petition and the Filing of the Second Petition

As noted in association with Factor 2, Biofrontera admittedly knew of every prior art reference asserted in the Second Petition at least at the time of the filing of the First Petition. Bansal and Larsen were asserted in the First Petition, and Lundahl is incorporated by reference in the '028 patent. Biofrontera could have raised the challenges in the Second Petition at the time of the First Petition—it simply elected not to. *See General Plastic* at 18 (factor 4 “allows us to assess and weigh whether a petitioner should have or could have raised the new challenges earlier”).

Accordingly, this factor strongly favors denial.

E. Factor 5: Whether the Petitioner Provides Adequate Explanation for the Time Elapsed Between the Filings of Multiple Petitions Directed to the Same Claims of the Same Patent

In its Notice Regarding Parallel Petitions (Paper 2), Biofrontera attempts to justify why it waited almost four months to file its Second Petition, despite knowing of the prior art in the Second Petition at the time of the filing of the First Petition. None of its justifications, however, are adequate to overcome the important policy concerns of *General Plastic*.

Most importantly, Biofrontera fails to explain why it needs to challenge the '028 patent with additional grounds of the type already present in the First Petition. First, Biofrontera argues that a Second Petition is necessary because it modified the

definition of a POSITA to require an engineer *and* an MD “to more clearly account for the medical treatment aspects of the ’028 Patent.” Paper 2, 4. However, this argument is belied by the First Petition in which Biofrontera challenged the *same claims* with overlapping prior art, yet Biofrontera’s proposed definition of the POSITA *did not require an MD*. IPR2024-00874, Petition, 8 (citing EX1003, ¶37). Biofrontera’s excuse that it needed to file a Second Petition on the eve of the Preliminary Response to the First Petition to modify the POSITA definition is clearly an abuse of the IPR process that, if tolerated, would open the floodgates to the filing of unwarranted serial petitions. *See* Patent Owner’s Response To Notice Regarding Parallel Petitions, filed concurrently herewith.

Second, Biofrontera alleges the Second Petition has “fewer proposed grounds” to consider, and the “perceived added burden to the parties to address the grounds in both IPRs” is “minimal.” Paper 2, 5. However, Biofrontera fails to mention that the First Petition has *one ground* directed to the independent claims 1, 5, 16, 20 and 21, while the Second Petition has *two grounds* directed to the *same* independent claims. The suggestion that the Second Petition presents less work for the Board, or that the burden of addressing two petitions on the same claims four months apart with different evidentiary records is somehow “minimal” is completely unfounded. Moreover, had Petitioner really wanted to reduce burden they could have requested termination of the First Petition instead of having the Board analyze

the First Petition and prepare an Institution Decision. Biofrontera has not justified why it deserves a second bite at the apple with respect to the Second Petition grounds. 35 U.S.C. §316(b).

For these reasons, this factor strongly favors denial.

F. Factor 6: The Finite Resources of the Board

The Board's finite resources would not be efficiently expended on Biofrontera's Second Petition, which asserts prior art Biofrontera itself elected not to assert in the First Petition. As noted above, all asserted prior art in the Second Petition was available to Biofrontera at the filing of the First Petition. When faced with word count issues, Biofrontera elected to assert references *other* than Lundahl. Upon inspection of Lundahl, it becomes apparent why—Lundahl lacks disclosure of claim limitations recited by the Challenged Claims. For example, as illustrated below, Lundahl's U-shaped fluorescent tube system does not teach an illuminator comprising five panels, where each of the panels has light sources arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.

Accordingly, this factor weighs strongly in favor of denial.

G. Factor 7: The Requirement to Issue a Final Determination Not Later Than One Year After the Date on Which the Director Notices Institution of Review

This factor is neutral because Biofrontera’s First Petition was denied institution. IPR2024-00874, Paper 9.

H. Summary of *General Plastic* Factors

On balance, the *General Plastic* factors overwhelmingly favor denial of Biofrontera’s Second Petition. Factors 1-6 all weigh strongly against institution, with only Factor 7 being neutral. Institution of Biofrontera’s Second Petition in the face of these circumstances would contradict the twin policies of “efficiency” and “fundamental fairness.” *General Plastic*, 18. Patent Owner therefore respectfully requests that the Board exercise its discretion under 35 U.S.C. §314(a) to deny institution for this reason alone.

VII. INSTITUTION SHOULD BE DENIED BECAUSE THE PETITION DOES NOT ESTABLISH A REASONABLE LIKELIHOOD OF SUCCESS ON THE MERITS

Petitioner presents two grounds based on obviousness. Petition, 9.

Ground	Claims	Theory	References
I	<u>1</u> , 2, 4, <u>5</u> , 6, <u>16</u> , 17, 19, <u>20</u> , <u>21</u>	Obviousness	Lundahl, Larsen
II	<u>1</u> , 2, 4, <u>5</u> , 6, <u>16</u> , 17, 19, <u>20</u> , <u>21</u>	Obviousness	Lundahl, Larsen, Bansal

As set forth below, Petitioner fails to show that the combinations of prior art render obvious the limitations of the Challenged Claims for multiple independent reasons.

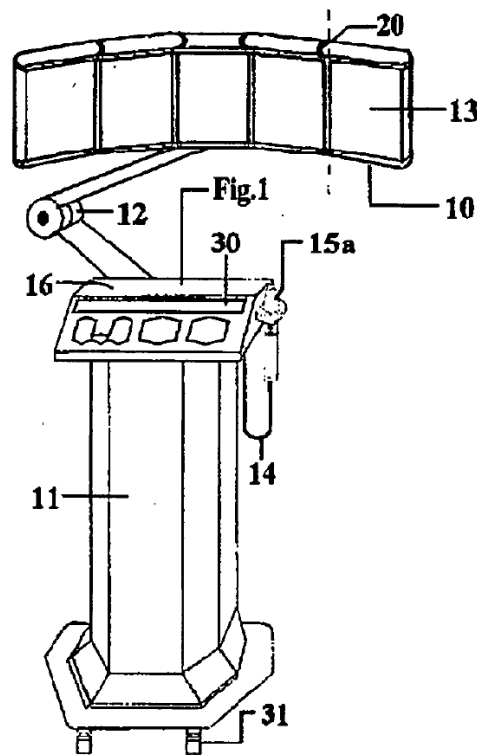
Because Petitioner has not demonstrated a reasonable likelihood of success on the merits, institution should be denied.

A. The Challenged Claims Are Patentable Over The Combinations Of Lundahl And Larsen And Lundahl, Larsen, And Bansal

1. Larsen Does Not Disclose Or Render Obvious “Hinged Structures On Inner Side Surfaces Of Adjacent Panels” (Grounds I and II)

Petitioner and Dr. Grove argue that Larsen discloses or renders obvious an “illuminator comprising five panels connected by hinged structures on inner side surfaces of adjacent panels,” as required by independent claims 1, 5, 20, and 21 of the '028 patent. Petition, 35-38, 55, 69-71, 73, 77; EX1015, ¶¶152-156, 198-199, 246-248, 257, 266, 277. However, Larsen does not disclose or render obvious this limitation for at least the reasons set forth below. EX2001, ¶¶94-105, 154-156.

First, there is no express disclosure in Larsen of “hinged structures on inner side surfaces of adjacent panels.” EX2001, ¶¶96-101. Larsen states that “several applicators 13 are flexibly connected to each other through *hinges 10*, respectively connecting one edge with the other.” EX1004, [0072]. As shown in Fig. 1 below, element “**10**” points to the **bottom** of the applicator 13, **not** to the inner side surface of the adjacent panels. EX1004, FIG. 1; EX2001, ¶96.



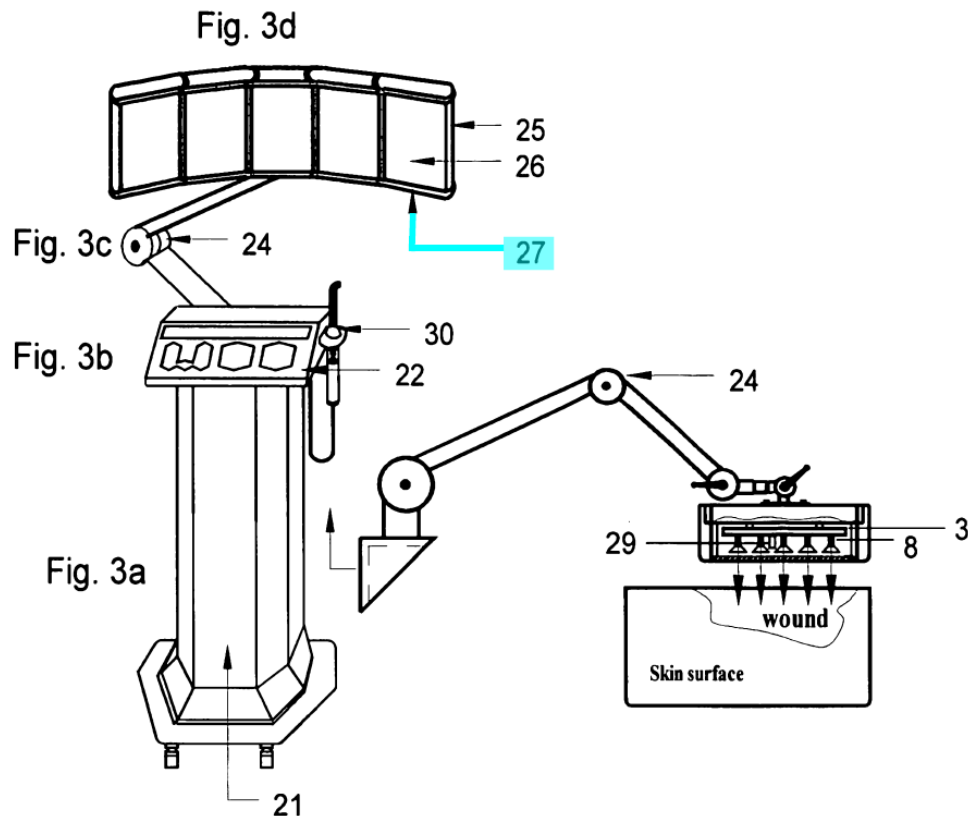
Despite Larsen’s clear labeling of “hinges” as element “**10**,” Petitioner argues that while the hinges are “indicated as element 10 in the specification,” they are “shown as element 20 in Figure 1.” Petition, 36-37; EX1015, ¶154.³ Petitioner’s

³ Petitioner makes these unsupported statements about the location of the hinges in Larsen, relying on the Examiner’s characterization of Larsen during prosecution for support. Petition, 36-37 (citing EX1002, 328 (citing EX1008, Fig. 1, 5:44-47); EX1009, ¶4 (citing EX1004, Figs. 1-3, [0069], [0072], lines 1-4); EX1015, ¶154). However, “hinged structures on inner side surfaces of adjacent panels” is simply not disclosed in Larsen. *See* IPR2024-00874, EX1003, ¶191 (Biofrontera’s expert, Dr.

argument is in direct conflict with Larsen’s express disclosure. As described above, element “**10**” is clearly labeled as “***hinges***” in Larsen’s specification. EX1004, [0072]. Element “**20**” is also described in Larsen’s specification and is ***not*** referring to the hinges **10**, but to the regular row arrangements of light sources on the applicators: “According to FIGS. 2*b* and 2*c* ***the light sources 17 are placed in regular row arrangements, i.e., 20*** equidistant from each other.” EX1004, [0071]; EX2001, ¶¶97-99. As such, a POSITA reading Larsen would have understood that “hinges **10**” refers to element **10** and not to element **20** in Fig. 1. EX2001, ¶¶97, 99 (citing EX0014, [0071]-[0072]).

Petitioner’s arguments are also in conflict with another Larsen publication (AU 2001/43869) (EX2004), which also identifies the hinges on the bottom of the applicators. EX2004, 14; EX2001, ¶100. For example, claim 19 of the Larsen publication recites “a flat applicator (25) consisting of a number of individual [*sic*] ***hinged (27)*** flat elements (26) which can be adjusted in angles to each other.” EX2004, 14. Like Fig. 1 of Larsen, Fig. 3d of the Larsen publication points to hinges on the ***bottom*** of the applicators (element 27 shown in blue below), ***not*** to any inner side surface of adjacent panels. EX2001, ¶100.

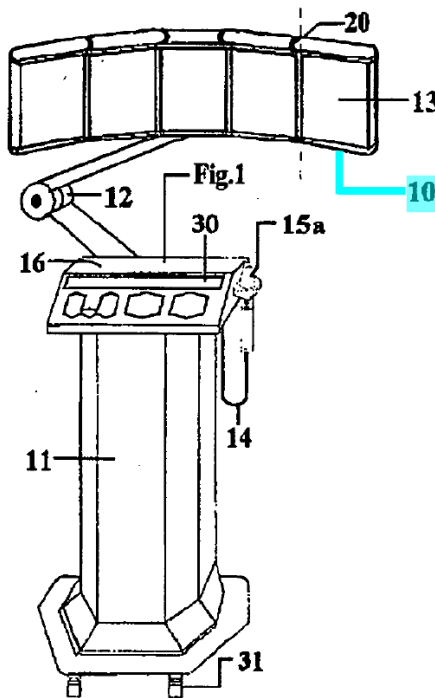
Bretschneider, admitting that “***Larsen is silent on the type of hinges.***”); *see also* EX2001, ¶¶98, 101.



EX2004, Fig. 3d. Like Larsen, the Larsen publication has no disclosure of “hinged structures on inner side surfaces of adjacent panels.” *Id.*

Second, there is no inherent disclosure in Larsen of “hinged structures on inner side surfaces of adjacent panels.” EX2001, ¶¶102-104. Petitioner asserts that because “the panels (13) are nearly flush with each other,” Larsen’s hinges are on inner side surfaces of adjacent panels. Petition, 36-37; EX1015, ¶154. However, a POSITA would have understood that Larsen’s hinges are ***not necessarily*** on inner side surfaces of adjacent panels. EX2001, ¶102 (citing EX1004, [0071], [0072], Fig. 1). As explained above, Larsen expressly discloses that its applicators **13** are connected to each other by “hinges **10**.” EX1004, [0072]. Element **10** in Fig. 1 of

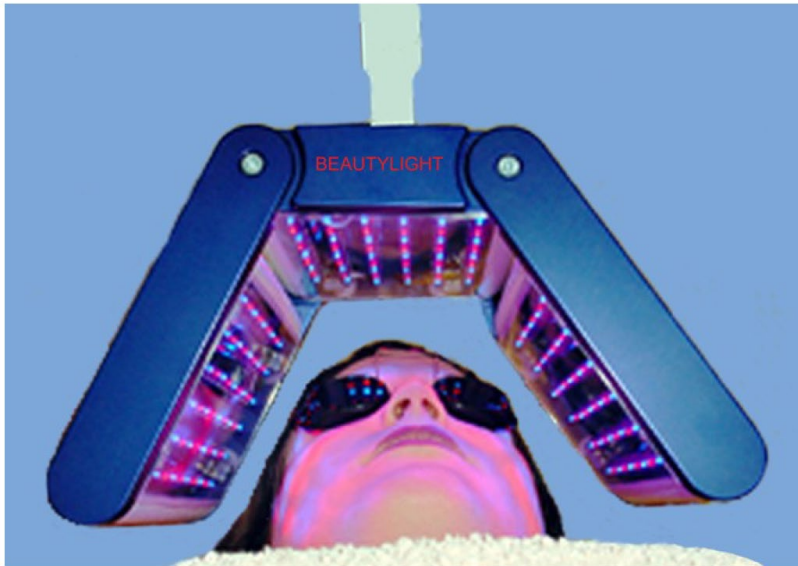
Larsen (shown in blue) points to the **bottom** of the applicator **13**, not any inner side surfaces.



EX1004, Fig. 1. To reiterate, Larsen refers to element **20** as light sources “placed in regular row arrangements, i.e., **20**” and never references element **20** as hinges. EX1004, [0071]; EX2001, ¶102.

Additionally, Petitioner’s inherency argument is inaccurate. EX2001, ¶103. The hinges are **not necessarily** on inner side surfaces of adjacent panels if the panels are “nearly flush with each other.” For example, the “BEAUTYLIGHT” illuminator (EX2005) manufactured by MDE Medizintechnik GmbH featured illumination panels flush with each other. EX2005, 10; EX2001, ¶103. As shown below, the

adjacent panels of the BEAUTYLIGHT are connected by hinges at the **bottom** of the panels. *Id.*⁴



As Dr. Grove admits, a “prior art reference inherently discloses the claim element **only** if the prior art reference must **necessarily** include the undisclosed claim element. *Inherency may not be established by probabilities or possibilities.*” EX1015, ¶30. Because Larsen’s hinges are not necessarily on the inner side surfaces of adjacent panels, Petitioner fails to meet its burden of showing inherency here.

⁴ The Statement of Use for U.S. Trademark Application Serial No. 78214595, which was submitted May 29, 2007, shows the BEAUTYLIGHT design, and the prosecution lists Eric Larsen (the named inventor of Larsen (EX1004)) as an addressee for MDE Medizintechnik GmbH. EX2005, 5-10, 14.

Third, Larsen does not render obvious “hinged structures on inner side surfaces of adjacent panels.” EX2001, ¶104. Petitioner and Dr. Grove provide only unsupported, conclusory argument that a POSITA “would have found it obvious to try placing the hinges on the inner side surfaces of the panels.” Petition, 37-38; EX1015, ¶155. They provide no evidence suggesting such a design was known to a POSITA at the time of the invention of the ’028 patent or explain why a POSITA would have been motivated to change Larsen’s hinges from the bottom of the applicators to inner side surfaces of the panels absent hindsight. For example, as disclosed by Larsen and as shown in BEAUTYLIGHT above, a POSITA would have attached hinges to the *bottom* of the panels. EX2001, ¶104. A POSITA would have further understood that there were numerous other designs that could have attached the hinges, for example, on the bottom or top of panels. *Id.*

Petitioner argues “there were finite number of known, predictable solutions for Larsen’s panels to be ‘flexibly connected to each other through hinges.’” Petition, 38. Petitioner provides no support for its argument. Indeed, Petitioner cites only to a paragraph of its expert’s declaration that merely regurgitates verbatim its unsupported assertions. Petition, 37-38 (citing EX1015, ¶155). Petitioner fails to show even one piece of prior art actually showing the claimed hinged structure. Such conclusory opinion, unsupported by actual underlying evidence, has been found to be insufficient to support alleged obviousness. *See Xerox*, IPR2022-00624, Paper 9,

16-18; *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2018-00827, Paper 9, 12-13 (Oct. 16, 2018) (informative). Conclusory statements are no more meaningful merely because they come from an expert. *Id.*; 37 C.F.R. §42.65(a).

Accordingly, Larsen does not disclose or render obvious an “illuminator comprising five panels connected by hinged structures on inner side surfaces of adjacent panels.” Petitioner has not met its burden for claims 1, 5, 20 and 21. Petitioner has not met its burden for dependent claims 2, 4, and 6 for the same reasons.

2. Larsen Does Not Disclose That “The Five Panels Are Individually Configurable To Control Illumination From Each Of The Five Panels” (Grounds I and II)

Petitioner and Dr. Grove argue that Larsen discloses “the five panels are individually configurable to control illumination from each of the five panels,” as required by independent claims 16 and 21 of the ’028 patent. Petition, 63-65, 72-73, 77; EX1015, ¶¶228-231, 262, 266, 277. However, Larsen does not disclose this limitation. EX2001, ¶¶106-118, 157-159.

None of Larsen’s disclosures relied on by Petitioner discloses that Larsen’s “five panels are individually configurable to control illumination from each of the five panels.” *First*, Petitioner asserts that Larsen discloses this limitation because Larsen teaches that “each of the applicators (13) ‘can be used in the working model according to Fig. 2a to 2c *individually*, side by side (in large numbers) or in

combination with an applicator.” Petition, 64 (citing EX1004, [0070]) (emphasis by Petitioner); EX1015, ¶229. However, Petitioner misreads Larsen’s disclosure. When properly read in context, Petitioner’s alleged support identifies the *printed circuit boards* as the subject, *not* “each of the applicators (13).” EX1004, [0070] (“The FIGS. 2a, 2b and 2c show plain surfaced *printed circuit boards* with light sources mounted in the applicators 13. *These* can be used in the working model according to FIG. 2a to 2c individually, side by side (in large numbers) or in combination with an applicator. *Furthermore the printed circuit boards....*”). EX2001, ¶108. When properly read in context, Larsen discloses only that the printed circuit boards can be used in the working model individually, side by side or in combination with an applicator, *not* that “five panels are individually configurable to control illumination from each of the five panels.” EX2001, ¶108; *Phillips*, 415 F.3d at 1314 (“the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms”).⁵

⁵ Again, Petitioner points to a conclusory statement by the Examiner that “col. 5, lines 19-22” of the Larsen ’381 patent “describes that the panels can be controlled individually.” Petition, 64, fn. 9 (citing EX1002, 328); EX1015, ¶229, fn. 8. However, the Examiner (like Petitioner) misreads Larsen’s ’381 disclosure. As

In fact, Petitioner has acknowledged that [0070] of Larsen teaches that “[t]hese circuit boards can be used ‘individually, side by side (in large numbers) or in combination with an applicator.’” IPR2024-00874, Paper 1, 20 (citing EX1004, [0070]). Under any of these three options—printed circuit boards used (i) individually, (ii) side by side, or (iii) in combination with an applicator—Larsen does not teach five panels individually configurable to control illumination from each of the panels, as claimed. That is, these 3 different use cases for the printed circuit boards do not teach each of Larsen’s applicators being individually configurable to control illumination from each applicator of a five-applicator device. EX2001, ¶108.

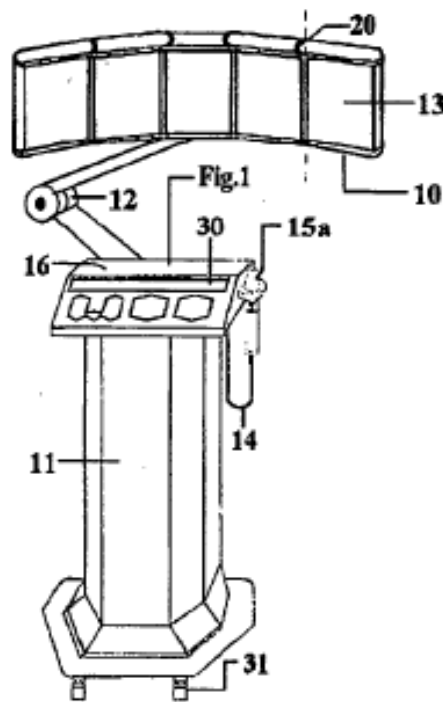
Second, Petitioner relies on Larsen’s disclosure that “[u]sing the control mechanism, ‘*the invented device* is adjustable within a relatively large range with reference to duration, amplitude and frequency of surge of current, so that the semiconductor diodes 17, 17a and 18, as well as laser 17 diodes with the same realisation as semiconductor diode 17, can be used as light sources.’” Petition, 64 (citing EX1004, [0074]); EX1015, ¶229. However, this passage discloses only that

discussed, that the printed circuit boards “can be used in the working model according to FIG. 2a to 2c *individually*” provides no disclosure that “five panels are individually configurable to control illumination from each of the five panels.” EX2001, ¶109.

“*the invented device* is adjustable,” *not* that each of the five applicators is individually configurable to control illumination from each of the five panels. EX2001, ¶110 (citing EX1004, [0074]).

Third, Petitioner relies on Larsen’s disclosure that “[t]he control mechanism includes ‘a switch select system for operating different types of semiconductor diodes 17 and/or with laser diodes. Both semiconductor diodes and/or laser diodes with tuneable wavelengths can be operated, which is a great advantage, and therefore the printed circuit boards can be equipped with a more intensive radiation effect.’” Petition, 64 (citing EX1004, [0074]); EX1015, ¶229. However, once again Larsen discloses that the control mechanism 16 is controlling and tuning the wavelengths of *the invented device*, *not* that the panels are individually configurable to control illumination from each of the five panels. EX2001, ¶111; EX1004, [0074] (“With the help of the control mechanism 16, *the invented device is* adjustable...*For that purpose the control mechanism is equipped with a switch select system* for operating different types of semiconductor diodes 17 and/or with laser diodes.”).

Fourth, Petitioner argues that “[e]ach of the applicators is connected to a control mechanism 16.” Petition, 64 (citing EX1004, [0070], FIG. 1); EX1015, ¶229 (citing FIGS. 1 and 4). However, Larsen shows only *one* control mechanism 16 for the *entire device*, not one control mechanism 16 connected to each of the applicators 13. EX2001, ¶112.



EX1004, FIG. 1. In fact, Larsen consistently depicts and refers to only “*the* control mechanism 16” and not to multiple control mechanisms. See EX1004, FIG. 4, Abstract (“The stand is freely moveable on wheels and includes *a control mechanism...*”), [0027] (“The stand, freely moveable on wheels, consists of *a control mechanism...*”), [0030] (“At least one of the applicator elements is equipped with feedback sensors for controlling the patient's response to the therapy, and via an automatic regulation system in *the control mechanism* it is possible to optimise the therapy results.... *The control mechanism* is also connected with a hand applicator...”), see also [0043], [0069], [0073], [0074], [0079], FIG. 4. EX2001, ¶¶112, 114-115. This is in contrast to the '028 patent, which discloses that “each panel may have a dedicated control unit to regulate power to the individual LED

array on a given panel,” and claimed “the five panels are *individually configurable* to control illumination from *each* of the five panels. EX1001, 5:57-62, 11:57-58; EX2001, ¶113.

Fifth, Petitioner argues that “each applicator is individually configurable, since each one can be adjusted by the controller based on feedback from its own sensors.” Petition, 65; EX1015, ¶230. To allegedly support its argument, Petitioner relies on Larsen’s disclosure that “each applicator includes sensors that ‘measure the amount of energy radiated away from the skin surface, which is indicative of the total energy penetrating into the tissue.’... A ‘sensor 32a is also contained in at least one of the machine applicators, measuring the temperature change of the radiated tissue, whereby the control unit can react with a feedback regulation of the radiation parameters depending on the therapy indication, location and (PDT) light sensitive substance used.’” Petition, 65 (citing EX1004, [0079]-[0080], Figs. 2a-2c); EX1015, ¶230. However, Larsen does not teach that each applicator 13 is adjusted individually based on the feedback received at the sensors 32. Rather, Larsen discloses that “[a]n increase of the registered amount of energy *can be achieved by the invented device* by increasing the operating potential (and thereby the pulse amplitude) or the pulse frequency and/or prolonging the duration of the treatment time *through an adjustment of the control mechanism 16*.” EX1004, [0079].

Larsen discloses changing the amount of energy emitted *by the device, not* by each applicator 13. EX2001, ¶116.⁶

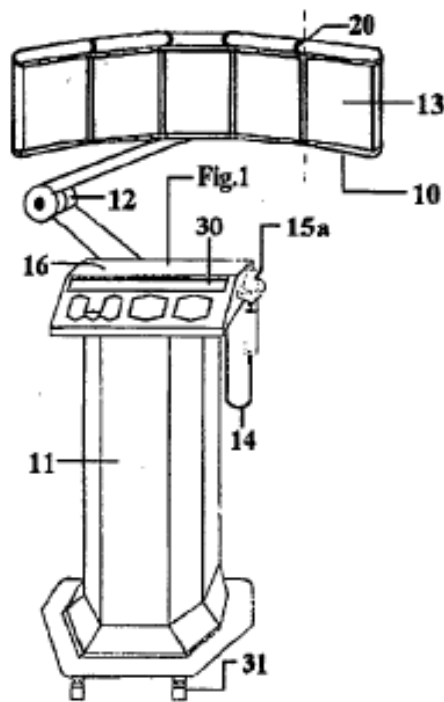
Accordingly, Larsen does not disclose that “the five panels are individually configurable to control illumination from each of the five panels.” Petitioner has not met its burden for claims 16 and 21. Petitioner has not met its burden for dependent claims 17 and 19 for the same reasons.

3. Larsen Does Not Disclose Or Render Obvious “A Mobile Base Supported By At Least Four Wheels” (Grounds I and II)

Petitioner and Dr. Grove argue that Larsen discloses or renders obvious “a mobile base supported by at least four wheels,” as required by independent claim 16 of the '028 patent. Petition, 58-59, 73, 77; EX1015, ¶¶213-216, 266, 277. However, Petitioner fails to meet its burden to show that Larsen discloses or renders obvious this limitation as set forth below. EX2001, ¶¶119-126, 160-162.

First, Larsen does not expressly disclose “a mobile base supported by at least four wheels.” EX2001, ¶121. Petitioner argues that Larsen “discloses a mobile base supported by at least four wheels” in Fig. 1. Petition, 58; EX1015, ¶213 (citing Fig. 1). However, as shown below, only two wheels are shown in Fig. 1 of Larsen.

⁶ Dr. Grove also references Larsen, ¶¶285-287, but Larsen has no such paragraphs.



EX1004, Fig. 1; IPR2024-00874, EX1003, ¶109 (Dr. Bretschneider admitting “only two wheels are shown in Fig. 1 of Larsen”). Therefore, Larsen does not expressly disclose “a mobile base supported by at least four wheels.” EX2001, ¶121.

Second, Larsen does not inherently disclose “a mobile base supported by at least four wheels.” EX2001, ¶¶122-124. Petitioner and Dr. Grove argue that Larsen’s device *necessarily* has four wheels “in order to provide stability.” Petition, 58-59; EX1015, ¶214. However, Petitioner and Dr. Grove’s arguments do not show that Larsen *necessarily* discloses “a mobile base supported by at least four wheels,” but merely establish the *possibility* that Larsen’s device has four wheels. EX2001, ¶¶122-124. With three wheels, Larsen’s device would still have been “freely moveable” and would not “require a user to tilt the entire system forward” or “create

an unbalanced system,” as Dr. Bretschneider argued. IPR2024-00874, EX1003, ¶265. For example, U.S. Patent 4,832,294, issued May 23, 1989, describes a stand for a medical device with three wheels that “rolls smoothly, easily and stably over irregular surfaces.” EX2006, 2:4-8, 2:21-30, FIG. 1; EX2001, ¶122.

As Dr. Grove acknowledges, “[i]nherency may not be established by probabilities or possibilities.” EX1015, ¶30. The mere *possibility* that Larsen’s device has four wheels does *not* establish that Larsen’s device inherently discloses “a mobile base supported by at least four wheels.” EX2001, ¶124.⁷

Third, Petitioner and Dr. Grove have not met their burden to show that Larsen renders obvious “a mobile base supported by at least four wheels.” EX2001, ¶125. Petitioner and Dr. Grove argue that using four wheels to support the base of Larsen would have been obvious to a POSITA because “it was well known that a four-

⁷ Petitioner points to the Examiner’s statement during prosecution of the ’028 patent that, in the Larsen ’381 patent, “it is inherent that there are at least two more wheels, for a total of 4, in order for the device to be stable.” Petition, 58-59 (citing EX1002, 328); EX1015, ¶214. But the Examiner failed to show inherency, because there were other known possibilities, including a three-wheeled device that moved “easily and stably.” See, e.g., EX2006, 2:4-8, 2:21-30, FIG. 1; EX2001, ¶¶122-124. And, like Petitioner, the Examiner’s conclusory statement is devoid of any evidence.

wheeled stand is much more stable than a stand with only three wheels.” Petition, 59; EX1015, ¶215. However, Petitioner’s arguments fail because they are conclusory and merely repeat declaration testimony that is unsupported by any evidence. *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1362 (Fed. Cir. 2019) (rejecting conclusory expert opinions “[u]ntethered to any supporting evidence, much less any contemporaneous evidence”); *see also Xerox*, IPR2022-00624, Paper 9, 16-18; 37 C.F.R. §42.65(a); EX2001, ¶104.

Moreover, contrary to Petitioner and Dr. Grove’s arguments, it was known that three-wheeled stands provided good stability, because each of the wheels is in contact with the floor. EX2001, ¶¶122-123, 125. For example, as discussed above, U.S. Patent No. 4,832,294 (EX2006) describes a medical device with a three-wheeled stand that “rolls smoothly, easily and stably over irregular surfaces.” EX2006, 2:4-8, 2:21-30. In contrast, a four-wheeled stand may not have each of the wheels in contact with the floor simultaneously, creating instability. EX2001, ¶125. Accordingly, Petitioner has not shown that Larsen discloses or renders obvious “a mobile base supported by at least four wheels.” Petitioner has not met its burden for claim 16. Petitioner has not met its burden for dependent claims 17 and 19 for the same reasons.

4. Petitioner Has Not Shown That A POSITA Would Have Been Motivated To Combine Lundahl With Larsen And Lundahl With Larsen and Bansal With A Reasonable Expectation Of Success (Grounds I and II)

Petitioner does not meet its burden to show that a POSITA would have been motivated to combine Lundahl in view of Larsen and Lundahl in view of Larsen and further in view of Bansal with a reasonable expectation of success. EX2001, ¶¶127-144, 163-170.

i. Petitioner Has Not Shown That A POSITA Would Have Been Motivated To Modify Lundahl's Device To Incorporate Larsen's Panels

Petitioner argues that a “POSITA would be motivated to combine the teachings of Lundahl and Larsen to incorporate the hinged panel LED displays of Larsen into the PDT device of Lundahl,” and that “the easiest way to modify the fixed, curved U-shape of Lundahl would be to incorporate hinged panels that could be individually adjusted to account for variations in head shape/size or other anatomy selected for treatment.” Petition, 25-31; EX1015, ¶¶118-128; EX1016, ¶¶38-44, 59-74, 87. However, Petitioner fails to show that a POSITA would have been motivated to modify Lundahl's device to incorporate Larsen's panels, or that a POSITA would have been motivated to modify Lundahl's device to comprise “*five* panels” as required by the claims. EX2001, ¶¶128-137, 164, 167.

First, Petitioner argues a POSITA would have been motivated to incorporate Larsen’s hinged panels “to ***provide the desired irradiance and irradiance uniformity to all target areas during PDT.***” Petition, 30; EX1015, ¶127. However, Petitioner fails to explain why a POSITA would have been motivated to address the precise issue Lundahl *already* solves. Lundahl expressly discloses that its U-shape “***provides the desired irradiance and irradiance uniformity*** for scalp and facial irradiation, and thus ensures that the proper visible light dosage is applied ***to all target areas during PDT.***” EX1014, 6:39-45, 15:22-27. EX2001, ¶¶129-131. *Life Spine, Inc. v. Globus Med., Inc.*, IPR2022-01603, Paper 8, 40 (Jun. 12, 2023) (denying institution where petitioner “has not articulated sufficient reasoning to explain why a POSITA would modify [its base reference] to address a concern [it] already addresses via a different mechanism.”); *Google LLC v. Jawbone Innovations, LLC*, IPR2022-00889, Paper 12, 20 (Nov. 14, 2022) (denying institution where petitioner failed to explain “motivat[ion] to solve a problem [the reference] already solves.”). Petitioner also argues Lundahl “would not allow for proper treatment of other parts of the anatomy.” Petition, 27-30; EX1015, ¶¶122-126; EX1016, ¶¶42-43, 72. But, Lundahl expressly teaches that the invention is

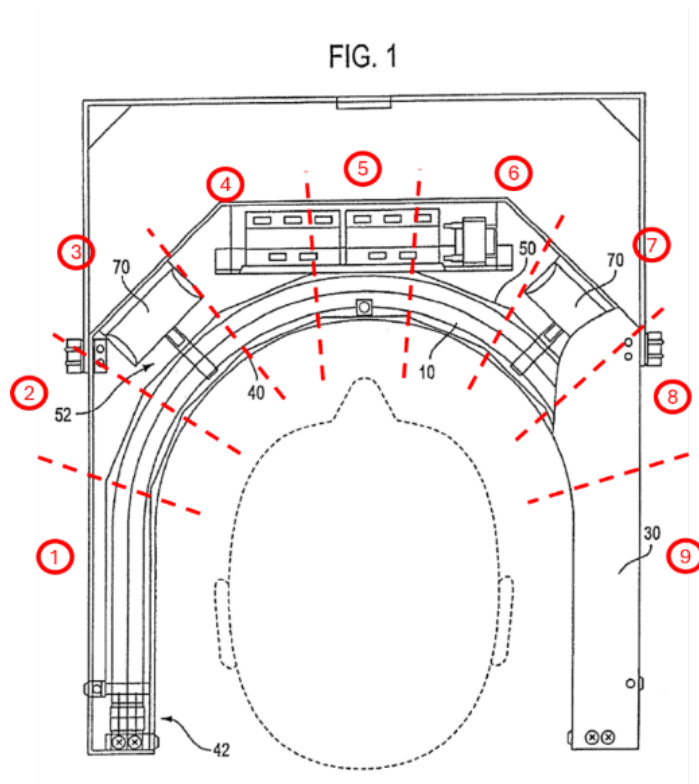
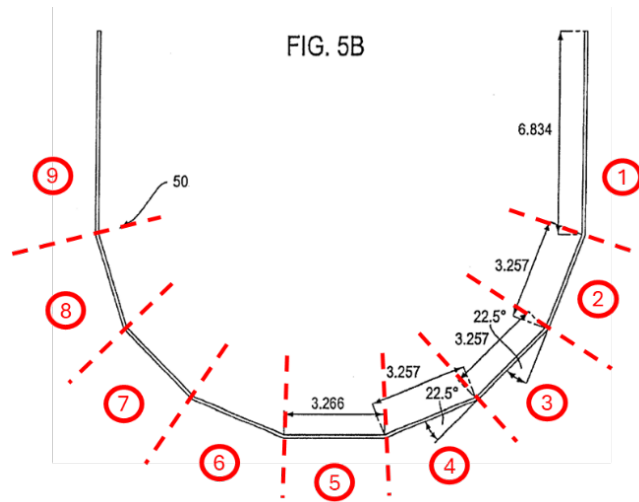
“directed to . . . other areas of the patient (e.g., arms, legs, etc.).” EX1014, 1:14-17; EX2001, ¶143.⁸

Second, a POSITA would have been discouraged from modifying Lundahl’s U-shaped tubes to incorporate Larsen’s five panels, because such modification would have created unwanted corners and gaps. EX2001, ¶¶132-133, 167. Indeed, Lundahl *expressly criticizes* “flat emitting surface[s]” that “would not deliver a uniform light dose to all contours of the face simultaneously,” and teaches to

⁸ Apparently recognizing Lundahl’s disclosure contradicts its argument regarding “other parts of the anatomy,” Petitioner resorts to Dr. Ehrenreich’s arguments regarding the commercial BLU-U® device. EX1016, ¶¶38-44, 67-74, 87. But such arguments regarding BLU-U are irrelevant because Petitioner does not show that BLU-U embodies Lundahl. And, in any event, BLU-U was used effectively on patients’ arms, legs, chest, and back, as Dr. Roberts explains. EX2015, ¶¶28-45 (citing EX2017-EX2024). Dr. Ehrenreich’s assertions regarding “problems” with fluorescence (EX1016, ¶68) and that it was “hard to treat hands, arms, and necks and upper chests” (EX1016, ¶43) and are belied by his own website that touts BLU-U and does not mention any alleged “problems.” EX2015, ¶¶40-45 (citing EX2025-EX2030). Moreover, Dr. Ehrenreich fails to propose any modifications or provide any solutions; he simply defers to “an engineer.” EX2015, ¶46; EX2001, ¶143.

“ameliorate this problem” with a “U-shaped emitting surface that more closely follows the contours of the human face and scalp, and minimizes lamp to target distance variations which in turn minimizes irradiance variations at the target.” EX1014, 4:29-38; EX2001, ¶132. Additionally, Petitioner does not explain how or why a POSITA would have combined Lundahl’s *stationary* device with Larsen’s scan engine that “move[s] the light sources with *linear movements*” to give “total radiation.” EX1014, FIG. 1, 5:34-35; EX1004, [0072]; EX2001, ¶¶132, 167. Petitioner fails to reconcile Lundahl’s and Larsen’s fundamentally different modes of operation or explain how the combined device would have uniformly illuminated a treatment surface, as required by the claims.

Third, a POSITA reading Lundahl’s disclosure would have been discouraged from incorporating *five* panels and would not have been motivated to modify Lundahl’s U-shaped fluorescent tubes to incorporate *five* panels. EX2001, ¶¶134-136, 164. As shown below, Lundahl’s reflector 50 has *nine* segments—not five—with each segment starting at a bend in the reflector “to approximately conform to the configuration of the tubes” and “increase[s] both the output irradiance and the uniformity of the output distribution”:



EX1014, FIG. 5B, FIG. 1, 5:30-32, 8:62-67. A POSITA reading Lundahl would have been led away from modifying Lundahl to incorporate *five* panels. EX2001, ¶¶134-136. The only plausible explanation for Petitioner's cherry-picking of *five* panels is hindsight analysis based on the '028 invention. As the Supreme Court has

held, “[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.” *KSR International Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007). Using the invention as a roadmap to re-create the invention from the prior art would improperly discount the value of combining various existing features or principles in a new way to achieve a new result, which is often the very essence or definition of invention. *KSR*, 550 U.S. at 418-19.

Furthermore, Petitioner fails to show that a POSITA would have had a reasonable expectation of success in combining Lundahl’s device with Larsen’s panels. EX2001, ¶137. Petitioner argues that a “POSITA would have had a reasonable expectation of success in combining Lundahl with Larsen, because both references describe similar illuminators for using light to treat conditions on a patient’s skin.” Petition, 31, 49. Petitioner’s argument fails because Dr. Grove provides only a single, conclusory statement that simply parrots Petitioner’s argument. EX1015, ¶128. *See TQ Delta*, 942 F.3d at 1362 (rejecting conclusory expert opinions “[u]ntethered to any supporting evidence, much less any contemporaneous evidence”); *see also Xerox*, IPR2022-00624, Paper 9, 16-18; 37 C.F.R. §42.65(a). Moreover, as discussed, modifying Lundahl’s U-shaped tubes to instead use five panels would have created unwanted gaps that would not deliver a uniform light dose. Dr. Grove provides no evidence as to how or why a POSITA

would have reasonably expected that modifying Lundahl's device with Larsen's five panels would have uniformly illuminated a treatment surface of the patient, as required by the claims. EX2001, ¶137.

ii. Petitioner Has Not Shown That A POSITA Would Have Been Motivated To Modify Lundahl's Device To Incorporate LEDs As Taught By Larsen And Bansal

Petitioner argues that a POSITA would have been motivated to “incorporate Larsen's solution of disposing light sources, specifically LEDs, on the surface of the light applicators to Lundahl's device” and “incorporate the non-uniform light arrangement of Bansal into the combination of Lundahl and Larsen.” Petition, 31-32, 73-74; EX1015, ¶¶129-131, 144, 268. However, Petitioner has not shown that a POSITA would have been motivated to modify Lundahl's device to incorporate LEDs as taught by Larsen and Bansal with a reasonable expectation of success. EX2001, ¶¶138-144, 163-170.

First, Petitioner argues that a POSITA would have been “motivated to modify Lundahl to incorporate LEDs *as taught by Larsen* rather than the fluorescent tubes.” Petition, 31-32 (citing EX1015, ¶¶129-131). But, Petitioner does not apply Larsen's teaching that the LEDs are “*placed in regular row arrangements, i.e., 20 equidistant from each other.*” EX1004, FIGS. 2a-2c, [0071]-[0072]; EX2001,

¶¶139, 164.⁹ Instead, Petitioner cherry-picks Larsen’s LEDs (together with the five panels) and purports to arrange them according to the “the uneven spacing” of Lundahl’s fluorescent tubes. Petition, 46-49; EX1015, ¶¶175-180. In doing so, Petitioner injects its own improper hindsight bias, which the Board should reject. Petitioner cannot reconstruct the invention from prior art elements using the invention as a template. *Ecolochem, Inc. v. So. Cal. Edison Co.*, 227 F. 3d 1361, 1371–72 (Fed. Cir. 2000) (finding that it is improper to use the patented invention as a blueprint or template to perform a hindsight reconstruction of the invention from prior art elements); Petition, 22-23 (citing EX1001). And Petitioner cannot on the one hand argue that a “POSITA would have understood that Larsen’s applicator is configured to uniformly illuminate a treatment surface of the patient,” while on the other ignore Larsen’s teaching that the “light sources 17 are placed in regular row arrangements.” *Ecolochem*, 227 F.3d at 1371 (“cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art”); Petition, 41-42 (citing EX1004, [0072]); EX1015, ¶164; EX2001, ¶139. The truth is, Petitioner arrived at its cherry-picked arrangement mish-mashing aspects of Lundahl and

⁹ Petitioner also fails to explain why a POSITA would have abandoned fluorescent tubes, when Larsen teaches to use fluorescent tubes for PD and PDT. EX1004, [0029], [0071], [0102], [0111], FIG. 2c; EX2001, ¶140.

Larsen (but avoiding the overall teachings of each) because it was targeting the “higher intensity” limitation of the claims.

Second, Petitioner fails to explain how or why a POSITA would have expected the combinations of fundamentally different systems to work. EX2001, ¶¶141, 164, 166. For example, Petitioner relies on Lundahl’s device and control system that “controls the ballast voltage (and tube output),” but fails to explain how Lundahl’s fluorescent system could work with Larsen’s and Bansal’s LEDs. Petition, 60; EX1015, ¶219 (citing EX1014, 11:19-29). Lundahl’s control system that supplies voltage to the ballasts driving the fluorescent tubes produces a high voltage, while LEDs require a low voltage. EX1014, 5:58-61 (“sufficiently high voltage potential across the cathodes”), 8:46-54 (“120 VAC line voltage”); EX2011 (Bourget), 1944 (“high power LED...3V”). A POSITA would have been discouraged from combining Lundahl’s device and control system with Larsen’s and Bansal’s LEDs because a POSITA would have been concerned that the high voltage supplied by Lundahl’s control system would damage or destroy the LEDs. EX2001, ¶¶141, 164, 166; EX2011 (Bourget), 1944-45. (“if the LED is connected directly to a power source of a voltage greater than the LED’s specified value” it “*can potentially damage or destroy the LED*”).

Petitioner also does not explain how or why a POSITA would have combined Lundahl’s control system that controls the light sources at *stationary* positions with

Larsen’s scan engine that “move[s] the light sources with *linear movements*,” and further with Bansal’s LEDs and diffusing panel that are “*center[ed]...over the subject*” during treatment. EX1014, FIG. 1; EX1004, [0072]; EX1005, [0030], [0036], FIG. 2; EX2001, ¶¶139, 167.

Petitioner further does not address the differences in treatment distance—Bansal teaches “LEDs suspended *12 inches* above a subject,” while Lundahl teaches “*distances of 4” and 2”*.” EX1005 (Bansal), [0007]; Petition, 45; EX1015, ¶171 (citing EX1014, 15:22-27). Petitioner fails to reconcile these fundamentally different modes of operation or explain how the alleged combined device modified by LEDs could uniformly illuminate a treatment surface or allow treatment within approximately four inches of the treatment surface, as required by the claims. EX2001, ¶¶141-142, 167-168.

Furthermore, Petitioner has not shown that a POSITA would have had a reasonable expectation of success in combining Lundahl’s tube-based device with Larsen’s and Bansal’s LEDs. EX2001, ¶¶142, 166, 169. Petitioner argues that a POSITA would have had a reasonable expectation of success in combining the references because “all three references describe similar illuminators for using light to treat conditions on a patient’s skin.” Petition, 32, 74. Petitioner’s argument fails because Dr. Grove provides only a single, conclusory statement that simply parrots Petitioner’s argument. EX1015, ¶¶131, 139, 269; *TQ Delta*, 942 F.3d at 1362;

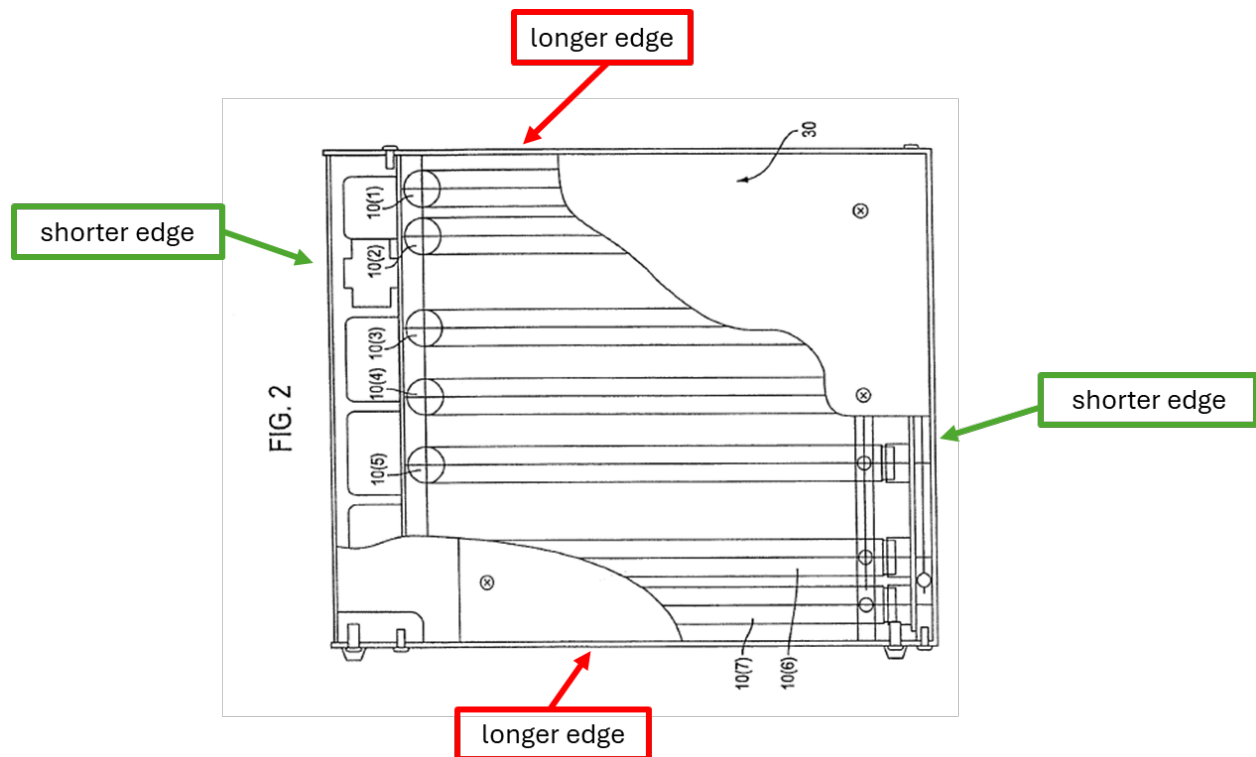
Xerox, IPR2022-00624, Paper 9, 16-18; 37 C.F.R. §42.65(a); EX2001, ¶¶142, 166, 169. Moreover, Petitioner provides no evidence for its conclusory statement that “the conversion from fluorescent tubes to LEDs was a routine practice prior to 2015.” Petition, 32; EX1015, ¶131. Rather, a POSITA would have understood that LEDs “cannot simply be purchased, wired up, and turned on if a high performance level is expected. Careful thought must be placed into the design of the thermal rejection, power supply, control, and optical subsystems of any LED lighting system.” EX2001, ¶¶142, 169 (citing EX2011 (Bourget), 1945).

5. Lundahl In View Of Larsen Does Not Render Obvious “The Light Sources Are Arranged Such That A Higher Intensity Of Light Is Emitted Proximate The Second Edges Compared To The Intensity Of Light Emitted Not Proximate The Second Edges” (Ground I)

Petitioner and Dr. Grove argue that Lundahl in view of Larsen renders obvious “the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges,” as required by independent claims 1, 5, 16, 20 and 21 of the ’028 patent. Petition, 46-49, 56, 67, 71, 73; EX1015, ¶¶175-181, 204-205, 238, 254-255, 264-265. However, Petitioner has not shown that Lundahl discloses or renders obvious this limitation in combination with Larsen. EX2001, ¶¶145-151.

First, Petitioner argues that a “POSITA would have understood that the tubes of Lundahl are spaced to emit a higher intensity of light proximate the top and bottom

sides compared to the intensity of light emitted not proximate the top and bottom sides.” Petition, 46-48; EX1015, ¶¶175-176 (showing FIG. 1 and FIG. 2 annotated). However, a POSITA reading Lundahl would have understood that the “top and bottom sides” of Lundahl’s device (as identified by Petitioner in “rotated” FIG. 2) are the *longer* edges, not the *shorter edges* as shown below:



EX1014, FIG. 2. EX2001, ¶¶147-148. Lundahl discloses that the “maximum visible light-emitting area [is] 36 cm high by 46 cm wide.” EX1014, 5:38-43, 5:31-33 (“[t]he overall dimensions of the unit are approximately 38 cm H×45 cm W×44.5 cm D”). Therefore, Lundahl discloses that the “top and bottom edges” identified by Petitioner are *longer* than the left and right edges. EX2001, ¶148.

Petitioner fails to consider the requirements of the higher intensity limitation as a whole and instead breaks the limitation into disjointed pieces. Petition, 45-46. When the entire claim limitation is read (“wherein each of the five panels has *two first edges and two second edges shorter than the two first edges*, and the light sources are arranged such that a higher intensity of light is emitted *proximate the second edges* compared to the intensity of light emitted *not proximate the second edges*”), it is clear that the claims distinguish between the shorter second edges and the longer first edges of the panels. In context, the plain language of the claims requires that the intensity of light emitted *proximate the shorter second edges* is higher than the intensity of light emitted *not proximate the shorter second edges*. *Phillips*, 415 F.3d at 1314 (quoting *ACTV, Inc. v. Walt Disney Co.*, 346 F.3d 1082, 1088 (Fed. Cir. 2003) (“the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms”). Lundahl’s disclosure relied on by Petitioner (EX1015, ¶175) does not meet the claim requirements because the “top and bottom sides” that Petitioner alleges emit a higher intensity of light are the *longer edges*, not the *shorter second edges* required by the claims. EX2001, ¶148.

Second, Petitioner argues that the “the PDT device and light distribution of Lundahl” combined with “the design principles of Larsen related to hinged panels and LED lights” renders obvious “the light sources are arranged such that a higher

intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” EX1015, ¶¶178-181; Petition, 49. However, Petitioner has not shown that its alleged “resulting device” based on the combination of Lundahl and Larsen discloses or renders obvious the claim limitation. EX2001, ¶¶149-151.

Petitioner purports to rely on Lundahl’s teachings of “light distribution,” but fails to read Lundahl’s teachings as a whole. For example, Lundahl discloses that the output from the U-shaped tubes is “*not inherently uniform*” and there are “*area[s] of reduced emission*” near the cathodes of the U-shaped tubes. EX1014, 6:10-20. Lundahl states that “the output measured in the immediate vicinity of the cathode is typically *much lower than the output over the rest of the tube*.” EX1014, 6:11-16. Lundahl explains that the “arrangement” of the “plurality of U-shaped tubes 10(1)-10(7)” “allows the cathodes and their *low output area* to be *located outside the active emitting area (effectively behind the patient’s ears)*.” EX1014, 6:16-22. Lundahl thus expressly teaches that the “arrangement” of light sources has “*area[s] reduced emission*,” as illustrated in red below:

FIG. 1

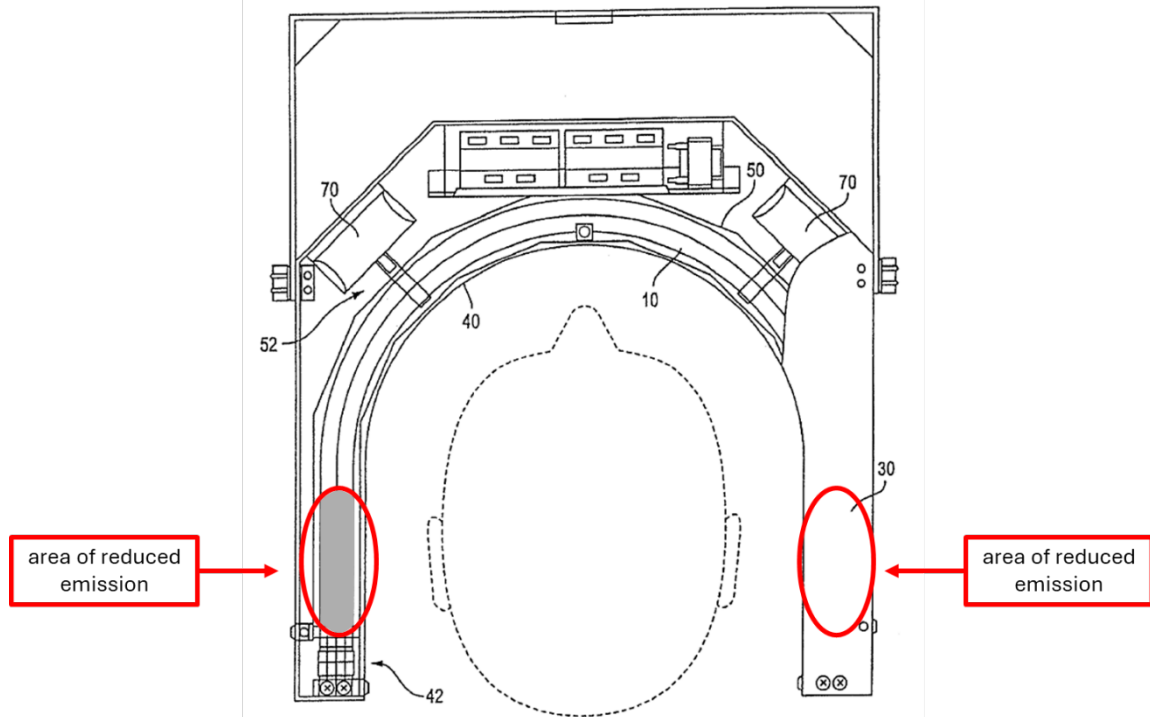
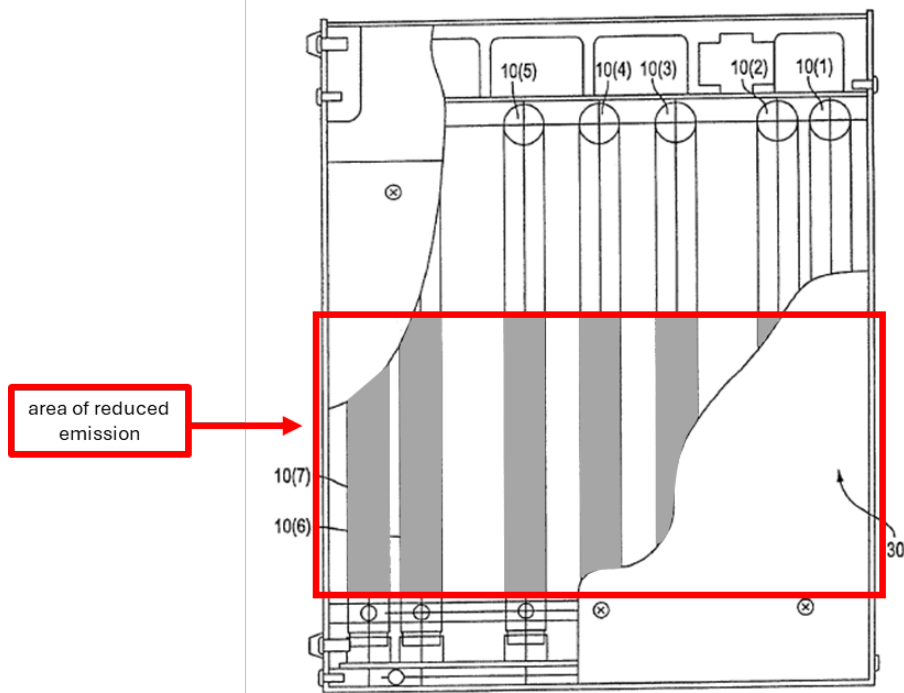


FIG. 2



EX1014, FIGS. 1 and 2. EX2001, ¶149. Indeed, Petitioner acknowledges that “fluorescent tubes are known to have inconsistent light output within the tube itself.” Petition, 31 (citing EX1014, 4:41-42); EX1015, ¶129.

Significantly, Petitioner fails to read the claim limitation as a whole, which requires that “***each*** of the five panels” has light sources arranged such that “a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” Petitioner’s alleged “resulting device” based on the combination of Lundahl and Larsen (EX1015, ¶178) contradicts Lundahl’s express teaching that Lundahl’s arrangement of light sources has “***low output area[s]***” of “***reduced emission***” (EX1014, 6:10-20). Petitioner asserts that its alleged “resulting device,” which “***maintain[s] the same light distribution pattern Lundahl utilized*** for the fluorescent bulbs,” would “increase the intensity of light emitted from the second edges (e.g., extending along the top and bottom sides of the panel arrangement) of the panels of Larson [*sic*] compared to regions not proximate to the second edges.” EX1015, ¶179. But, contrary to Petitioner’s assertions, a POSITA applying Lundahl’s teachings of “light distribution” would have understood that some of the panels of the “resulting device” (EX1015, ¶178) would have had “***area[s] of reduced emission***” as illustrated above in FIGS. 1 and 2. EX2001, ¶150. In other words, the light emitted proximate the second edges of ***each*** panel would ***not*** be higher intensity than the light emitted not

proximate the second edges, because of the “low output area[s]” on at least the outer panels. EX2001, ¶150. Therefore, even if a POSITA would have combined “the PDT device and light distribution of Lundahl” with Larsen’s LED panels, Petitioner has not shown that the “resulting device” would render obvious the claim limitation, requiring that “***each*** of the five panels” has light sources arranged such that “a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” EX2001, ¶¶149-150.

Petitioner improperly cherry-picks Lundahl’s light distribution and Larsen’s LEDs while improperly ignoring Lundahl’s teaching that the plurality of light sources has “***area[s] of reduced emission***” in an attempt to reconstruct the ’028 patent’s invention. EX1014, 6:10-20; *Ecolochem*, 227 F.3d at 1371 (“cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art”).

Accordingly, Lundahl in view of Larsen renders does ***not*** render obvious the higher intensity limitation present in all of the independent claims of the ’028 patent “wherein each of the five panels has two first edges and two second edges shorter than the two first edges, and the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.” Petitioner has not met its burden for any Challenged Claims.

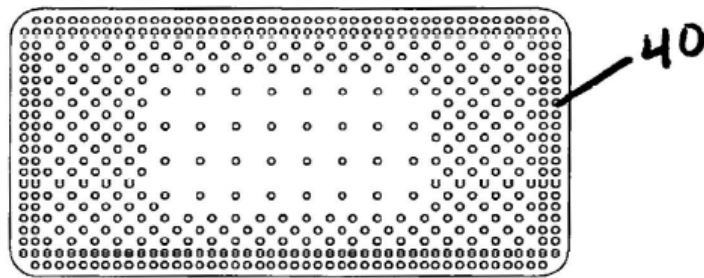
6. Lundahl In View Of Larsen And Further In View Of Bansal Does Not Render Obvious “The Light Sources Are Arranged Such That A Higher Intensity Of Light Is Emitted Proximate The Second Edges Compared To The Intensity Of Light Emitted Not Proximate The Second Edges” (Ground II)

Petitioner argues that Lundahl in view of Larsen and further in view of Bansal renders obvious “the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges,” as required by independent claims 1, 5, 16, 20 and 21 of the '028 patent. Petition, 75-77; EX1015, ¶¶271-275. Petitioner argues that Bansal discloses this limitation. *Id.*¹⁰ However, Petitioner has not shown that Bansal discloses or renders obvious this limitation in combination with Lundahl and Larsen. EX2001, ¶¶171-179. *The Board should find Ground II deficient for the same reasons it denied institution of the First Petition*, namely “Petitioner has not sufficiently shown for institution that Bansal teaches or suggests arranging light sources ‘such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges.’” IPR2024-00874, Paper 9, 17.

¹⁰ Petitioner argues “Bansal’s teachings are in addition to what Lundahl and Larsen teach” (Petition, 75). As discussed in Section VII.A.5, Lundahl in combination with Larsen fails to disclose or render obvious this limitation.

Petitioner and Dr. Grove argue Bansal discloses varying “the density of light source distribution ... throughout the array, such as with *higher density in the periphery and a lower density in the center*” and that “Figure 9b of Bansal shows one embodiment where more light sources are placed near the edges of the panel compared to the light sources in the center.”

Fig. 9b



Petition, 75-76 (citing EX1005 [0025], claim 10, Figs. 9a-9d); EX1015, ¶272. In addition, they argue Bansal discloses “*driving the light sources with a lower power in the center and a higher power on the outer edges.*” Petition, 77 (citing EX1005, [0025]-[0026]); EX1015, ¶273. However, none of Bansal’s disclosures teaches that “the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges,” as required by all of the independent claims. EX2001, ¶¶172-176.

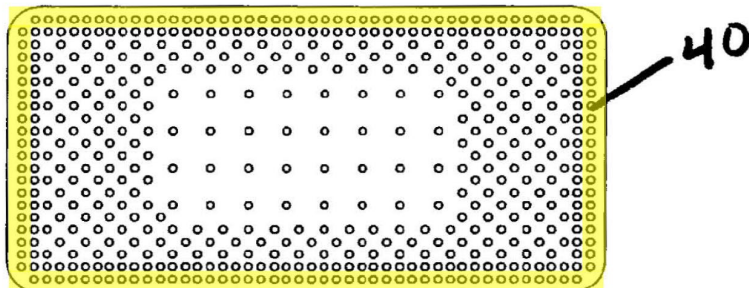
Petitioner and Dr. Grove fail to consider the requirements of the higher intensity limitation as a whole and instead break the limitation into disjointed pieces.

Petition, 45-56, 75-77. When the entire claim limitation is read (“wherein each of the five panels has *two first edges and two second edges shorter than the two first edges*, and the light sources are arranged such that a higher intensity of light is emitted *proximate the second edges* compared to the intensity of light emitted *not proximate the second edges*”), it is clear that the claims distinguish between the shorter second edges and the longer first edges of the panels. In context, the plain language of the claims requires that the intensity of light emitted *proximate the second edges* be higher than the intensity of light emitted *not proximate the second edges, which includes at least light proximate the first edges*. EX2001, ¶¶174-178; *Phillips*, 415 F.3d at 1314 (quoting *ACTV, Inc. v. Walt Disney Co.*, 346 F.3d 1082, 1088 (Fed. Cir. 2003) (“the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms”).

Contrary to the claim requirements, Petitioner admitted that “Bansal’s solution provides higher intensity (or density) of lights *around all edges of the panel*.” IPR2024-00874, Paper 1, 18 (citing EX1003, ¶154). Bansal discloses “*higher density in the periphery* and a lower density in the center” and “lower power in the center and a *higher power on the outer edges*” Petition, 75-77; EX1015, ¶¶272-273 (citing EX1005, [0025]); EX2001, ¶¶175-176. As shown in Fig. 9b relied on by Petitioner, the intensity of light emitted proximate *both* the second edges *and* the first edges (e.g., shown in yellow below) is higher than the intensity of light

emitted in the center of the array. See Petition, 76-77; EX1015, ¶272 (citing EX1005, Fig. 9b).

Fig. 9b



EX1005, Fig. 9b. Bansal distinguishes between higher intensity (or density) of lights “*around all edges of the panel*” and the center of the panel instead of between the intensity of light emitted proximate the second edges and *not proximate the second edges*, which includes at least light proximate the first edges. Bansal thus fails to disclose “a higher intensity of light is emitted proximate the second edges compared to the intensity of light emitted not proximate the second edges,” as required by the claims. EX2001, ¶¶174-176.

This distinction between the first and second edges is supported by the specification of the '028 patent. For example, as shown in Fig. 5 below, the '028 patent distinguishes between areas 1 and 2 (shown in red) proximate the shorter second edges and areas 3 and 4 (shown in yellow) proximate the longer first edges. “[A]reas 1 and 2 emit a higher intensity of light than areas 3 and 4.” EX1001, 6:33-38; EX2001, ¶177.

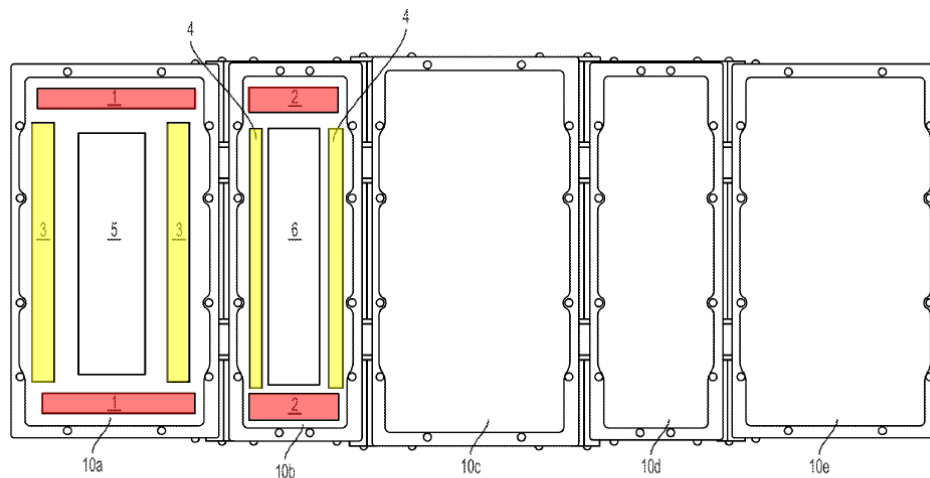


FIG. 5

EX1001, Fig. 5. This is in direct contrast to Bansal’s solution that discloses a higher intensity (or density) of lights “*around all edges of the panel.*” IPR2024-00874, Paper 1, 18; IPR2024-00874, EX1003, ¶154. Petitioner’s reliance on Bansal’s disclosure of higher intensity *around all edges of the panel* is misplaced because both the specification and the claims consistently distinguish between areas proximate the shorter second edges that emit a higher intensity of light than areas proximate the longer first edges. EX2001, ¶¶177-178.

Accordingly, Lundahl in view of Larsen and further in view of Bansal does *not* render obvious the higher intensity limitation present in all of the independent claims of the ’028 patent “wherein each of the five panels has two first edges and two second edges shorter than the two first edges, and the light sources are arranged such that a higher intensity of light is emitted proximate the second edges compared

to the intensity of light emitted not proximate the second edges.” Petitioner has not met its burden for any Challenged Claims.

VIII. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board deny institution of the Petition.

Dated: November 27, 2024

Respectfully submitted,

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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

I hereby certify that this paper, excluding the portions exempted under 37 C.F.R. § 42.24(a), has 13,358 words as counted by Microsoft Word 365, the word-processing system used to prepare this paper.

Dated: November 27, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on November 27, 2024, a complete copy of the foregoing was served on counsel of record for Petitioner by filing this document through P-TACTS and by sending this document via electronic mail to the following addresses:

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