

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MERCEDES-BENZ USA, LLC
Petitioner,

v.

YECHEZKAL EVAN SPERO
Patent Owner.

U.S. Patent No. 10,894,503

IPR Case No.: IPR2023-01026

PATENT OWNER SUR REPLY

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List of Exhibits

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2001	Declaration of Matthew A. Turk, PhD
2002	Curriculum Vitae of Matthew A. Turk, PhD
2003	Best Practices and FAQs for Filing Requests for Reexamination Compliant with 37 CFR 1.510 and 1.915, PTAB, May 2010
2004	Intentionally left blank
2005	Intentionally left blank
2006	U.S. Published Patent Application US2003/0137849A1 to Alden, Prosecution History in the U.S. Patent and Trademark Office
2007-2039	Intentionally left blank
2040	Second Declaration of Matthew A. Turk, PhD
2041	Transcript of Deposition of Nikolaos Papanikolopoulos, Ph.D. <i>Mercedes Benz-USA, LLC v. Yechezkal Evan Spero</i> , taken on February 23, 2024 IPR2023-01039, IPR2023-01040
2042-2049	Intentionally left blank
2050	Jianzhong Jiao and Ben Wang, “Etendue Concern for Automotive Headlamp Using LEDs,” SPIE Proceedings Vol. 5187, (January 2004) (Available at https://www.spiedigitallibrary.org/conference-proceedings-of-spie/5187/0000/Etendue-concerns-for-automotive-headlamps-using-white-LEDs/10.1117/12.504363.short)
2051	Michael Bass, <i>Handbook of Optics</i> 3 RD Edition Volume II, (McGraw-Hill, 2010) (Available at https://www.worldcat.org/title/555545456)
2052	Ben Wang and Jianzhong Jiao “Studies for Headlamp Optical Design Using LEDs,” SAE Technical Paper Series 2004-01-0434, (March 2004) (Available at https://www.sae.org/publications/technical-papers/content/2004-01-0434/)

Exhibit No.	Description
2053	Ben Wang and Jianzhong Jiao “Optical Transform Limitations in Headlamp Photometric Performance,” SAE Technical Paper Series 2005-01-0861, (April 2005) (Available at https://www.sae.org/publications/technical-papers/content/2005-01-0861/)
2054	Intentionally left blank.
2055	Jianzhong Jiao and Ben Wang “High-Efficiency Reflector Optics for LED Forward Lighting,” SPIE Proceedings Vol. 6670, (September 2007) (Available at https://www.spiedigitallibrary.org/conference-proceedings-of-spie/6670/66700M/High-efficiency-reflector-optics-for-LED-automotive-forward-lighting/10.1117/12.730524.short)
2056	Navigant Consulting “Energy Saving Estimates of Light Emitting Diodes in Niche Lighting Applications” Building Technologies Program Office of Energy Efficiency and Renewable Energy U.S. Department of Energy (September 2008) (Available at Energy Savings Estimates of Light Emitting Diodes in Niche Lighting Applications (Technical Report) OSTI.GOV.)
2057	Intentionally left blank
2058	Intentionally left blank
2059	Intentionally left blank
2060	Michael Bass, <i>Handbook of Optics</i> 3 RD Edition Volume V, (McGraw-Hill, 2010) (Available at https://www.worldcat.org/title/557121959 .)
2061	Texas Instruments/Digikey “How DLP Technology Works,” (Available at https://www.digikey.com/en/product-highlight/t/texas-instruments/dlp-technology .) (Accessed September 12, 2023.)
2062	Texas Instruments “Introduction to +/- 12 Degree Orthogonal Digital Micromirror Devices (DMDs) (Available at https://www.ti.com/lit/an/dlpa008b/dlpa008b.pdf?HQS=dis-dk-null-digikeymode-dsf-pf-null-ww&DCM=yes&distId=10) (Accessed September 12, 2023.)

Exhibit No.	Description
2063	Surendra Gupte, Osama Masoud, Robert F. K. Martin, and Nikolaos P. Papanikolopoulos “Detection and Classification of Vehicles” IEEE Transactions on Intelligent Transportation Systems, Vol. 3, No. 1 (March 2002) (Available at https://ieeexplore.ieee.org/document/994794) (Accessed February 20, 2024)
2064	Intentionally left blank.
2065	Webster’s New Universal Unabridged Dictionary Deluxe 2 nd Edition excerpts, Simon and Schuster (1983)
2066	Transcript of Deposition of Nikolaos Papanikolopoulos, Ph.D. <i>Mercedes Benz-USA, LLC v. Yechezkal Evan Spero</i> , taken on March 26, 2024, IPR2023-01026, IPR2023-01027
2067	Transcript of Deposition of Nikolaos Papanikolopoulos, Ph.D. <i>Mercedes Benz-USA, LLC v. Yechezkal Evan Spero</i> , taken on March 27, 2024, IPR2023-01034

I. The Petition Relies on an Inoperable Combination that Can't Be Remedied Post-Institution

An overarching problem plagues Petitioner's proofs, the Petition ("Pet.") relies on Alden's two-dimensional switch array (from Figure 3) to control and power the Figure 5 one-dimensional LED array—creating an inoperable combination. (POR, 18.) The Petition embraces the Figure 5 one-dimensional teachings as is, never suggesting a modified interpretation. (Pet., 13-16.)

Petitioner's language in its argument for its independent claim proofs confirms that Petitioner used the Figure 5 array as a single line of LEDs having one-dimension of emission: 1) the LEDs are "on **a** curve along the focal point of a headlight lens 121" (Pet., 14, 27, 37, 43)¹; 2) "different groups project[] light into different areas in front of the vehicle, *e.g.*, **left, center, right**" (Pet., 14); 3) relative to the vehicle, annotated emission is described as and falls within three areas: **left, in front, and right** (*Id.*, 14-15); 4) regarding claim 20, the Petition reproduces Figure 5 and states "**each** lighting element is directed **at a different angle** relative to the front of the vehicle, based on its position **along the curve**"—which confirms a single line of LEDs, if the array were "stacked," vertically stacked lighting elements would share a common angle (Pet., 27-28); and 5) the Petition examples

¹ Emphasis added by Patent Owner unless otherwise noted.

and claim proofs rely exclusively on describing emission along a single axis: “[a]ny lighting element angled away from an oncoming vehicle (**e.g., towards the side of the road**)” (Pet., 28; *see also* 32-36 directed to claim 26.) The Petition is devoid of any suggestion that Figure 5 inherently includes vertical stacks of LEDs that provide emission control in a second dimension, with multiple foci. (*See e.g.*, Pet., 13-16.)

Likewise, the Petition unequivocally relies on the Figure 3 two-dimensional switch array to power the one-dimensional LED array from Figure 5. (Pet., 17-20.) Whether there is an alternative, unpresented argument that a POSA would modify the two-dimensional switch array to power the one-dimensional LED array of Figure 5 or modify Figure 5 to utilize a two-dimensional LED array is irrelevant—Petitioner did not present any such modification and must live with the shortcomings of the inoperable combination it proffered. As the Supreme Court explained in *SAS Institute*, a Petition “guide[s] the life of the litigation,” and Petitioner's contentions “define the scope of the litigation all the way from institution through to conclusion.” *SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348, 1351, 1356, 1357 (2018).

II. To Address the Lack of Operability, the Reply Impermissibly Injects a New Argument

It was only on Reply, after the defect was identified by Patent Owner (“PO”)

and the Institution Decision (“DI”, 10) offered new alternative interpretations, that Petitioner belatedly argued that Figure 5 should be interpreted as depicting a one-dimensional **section** of a two-dimensional array. (Reply, 2.) Under Petitioner’s new reply argument, a POSA would modify the express depiction and description of the Figure 5 LED embodiment, so it matches Figures 6-7 from the second embodiment and the two-dimensional switch array from Figure 3. (*Id.*) As the “master of its complaint,” Petitioner could have presented this argument in its Petition, but did not, instead treating a one-dimensional row of LEDs as sufficient for its proofs—without appreciating the issues created by using that array with a two-dimensional switch array, and without appreciating that this results in an impermissibly modified embodiment for anticipation purposes. *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 775 (Fed. Cir. 2018) (quoting *SAS Institute, Inc.*, 138 S. Ct. 1348, 1355 (2018)). In its 2019 Consolidated Trial Practice Guide, the PTAB emphasized that “Petitioner may not submit new evidence or argument in reply that it could have presented earlier, e.g., to make out a *prima facie* case of unpatentability.” (Consolidated Trial Practice Guide, November 2019 (“CTPG”), 73.)

This case is also distinguishable from the line of cases that allow Petitioner to respond to a new claim construction theory or a new argument in a responsive brief. *See Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1382-83 (Fed. Cir.

2023). Here, Petitioner’s new argument—copied from the DI—is simply an impermissible attempt to rewrite its Petition to correct flawed proofs, relying on new embodiments to bolster a new interpretation of how a POSA would read Figure 5 for their independent claim proofs. On this point the law is settled—“an IPR petitioner may not raise in reply ‘an entirely new rationale’” *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1330–31 (Fed. Cir. 2019) (quoting *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1370 (Fed. Cir. 2016)). The regulation “reflects ... efficiency and fairness interests[,]” *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1368 (Fed. Cir. 2015), and flows from the statutory “requirement that the initial petition identify ‘with particularity’ ... ‘the grounds for the challenge to each claim.’” *Intelligent Bio-Systems*, 821 F.3d at 1369 (quoting 35 U.S.C. § 312(a)(3)). Petitioner never attempts to anchor its new, meaningfully distinct argument to the Petition, instead submitting a wholly new declaration to support its stance. (Reply, 2-4.) Petitioner’s sole cite to a Petition-related document is to ¶55 of the original declaration (Ex.1003), a paragraph which plainly discusses the array as directing light to the “left,” “front” and “right” of the vehicle and lacking any mention of vertical segmentation or control. (Reply, 2.)

PO’s identification of the defective proof and response to the Board’s hypothetical interpretation does not give Petitioner license to rewrite the Petition

proof on reply. Per *Intelligent Bio-Systems* because Petitioner presented an anticipation ground and waited until its reply to present a new theory as to how a POSA would understand Figure 5, the Board should decline consideration of the new theory under 37 C.F.R. § 42.23(b). *Intelligent Bio-Systems*, 821 F.3d at 1370.

Neither Petitioner nor the Board is allowed to fill the gaps in Petitioner's original proof. As such, every ground of Petitioner's proofs fails.

III. Petitioner's New Argument Is Neither Permissible Under the Anticipation Ground It Proffered Nor Supported by Alden

To rectify its inoperable combination, Petitioner presents new reply arguments that incorrectly interpret the Figure 5 (LED) embodiment based on teachings related to a different (single light source) embodiment depicted in Figures 6-7, modifying Figure 5 so it depicts "a sectional view of a row of LEDs" (Reply, 2.) However, "[p]rior art that must be modified to meet the disputed claim limitation **does not anticipate** the claim." *Apple Inc. v. Corephotonics, Ltd.*, 861 F. App'x 443, 450 (Fed. Cir. 2021) (citations omitted).

As stated in the POR, Alden presents three distinct embodiments with varying structural configurations of light sources, optics and materials. A POSA would not look to the second and third embodiments to interpret the first LED embodiment, let alone as clear support to **modify** the actual Figure 5 disclosure. (POR, 7-11.) See *Microsoft Corp. v. Biscotti, Inc.*, 878 F.3d 1052, 1069 (Fed. Cir.

2017) (citations omitted) (“[A]nticipation is not proven by ‘multiple, distinct teachings that the artisan might somehow combine to achieve the claimed invention.’”). Petitioner’s anticipation proofs should thus be limited to the disclosure associated with Figure 5. Moreover, Figure 6’s and 7’s showings of two-dimensional elements undercuts Petitioner’s position, as it establishes that when Alden **intended** to show two-dimensional segmentation it clearly did so. (Ex.1005, Figs 6-7.)

On Reply, Petitioner also attempts to modify Figure 5 based on the two-dimensional switch array of Figure 3: “Alden explains Figure 5’s LED ‘array’ is controlled by corresponding switches from a switch array using the ‘CPU and logic *previously described*’” (Reply, 2, emphasis in original.) Petitioner’s truncated quote incorrectly states that the “array” is controlled by the previously described CPU and logic. Alden actually says—“[e]ach **switch** is controlled by the CPU and logic previously described.” (Ex.1005, ¶¶[0029], [0047].) Notably, Alden’s ¶[0029] only borrows the *previously described CPU and logic for controlling a switch* to provide power, and thus has no bearing on the specific configuration of the switch array. (*Id.*, ¶[0029]). This is further evidenced by the example that Alden **immediately** provides as further explanation: “[f]or example the power 119 is controlled by the CPU which **dictates its respective switch characteristics at 115 such that the power ... is controlled ...**” (*Id.*) Thus, Figure 5 discloses an

array of 9 LEDs, where each of the 9 LEDs is controlled by a corresponding switch, and the CPU controls the power via switches. (POR, 23-25.)

What is not present is any teaching that the Figure 5 LED array is controlled by the “previously described” Figure 3 switch arrays 55a and 55b. The “previously described” connection between Figures 3-4 and Figure 5 is limited to CPU/logic for control of the switches and does not extend to the illustrated “architecture of the elements[,]” which are called out as a separate component of Figure 3. (See Ex.1005, ¶[0012]).

Given that: 1) Alden describes the illustration of Figure 5 as “[t]he segmented headlight ... and controlling switch array” and not a cross-section; 2) Figure 5 depicts a complete segmented headlight system, including nine separate segment wires from the array, one to each LED shown, powered by the CPU/logic of Figures 3-4; 3) there are notable differences between the one-dimensional array depiction of Figure 5 versus the two-dimensional array depictions in Figures 6-7 and 10; 4) Alden expressly discloses arranging the LEDs of Figure 5 “on **a curve along the focal point** of a headlight lens[,]” (*Id.*, ¶[0029]); and 5) there is a complete absence of a clear, express disclosure (or even a suggestion) that Figure 5 should be interpreted as a section of a two-dimensional array, Alden lacks “sufficient precision and detail” to “necessarily” require an interpretation of the Figure 5 LED embodiment as a section of a two-dimensional array, per the

doctrine of inherent anticipation. *See Verve, LLC v. Crane Cams, Inc.*, 311 F.3d 1116, 1120 (Fed. Cir. 2002) (anticipation requires that “[a] single reference must describe the claimed invention with sufficient precision and detail to establish that the subject matter existed in the prior art.”); *see also Rexnord Indus., LLC v. Kappos*, 705 F.3d 1347, 1355 (Fed. Cir. 2013) (“anticipation by inherent disclosure is appropriate only when the reference discloses prior art that must necessarily include the unstated limitation”) (citation omitted). Petitioner’s inferential evidence requires speculation (per Petitioner’s own expert) outside the four corners of Alden’s teachings and is thus insufficient to satisfy Petitioner’s anticipation burden. (Ex.2041, 108:14-18.)

Were Figure 5 interpreted to include additional rows of LEDs, Alden lacks details regarding how the hypothetical structure would be put together—notably whether the two-dimensional LED structure would form a semi-cylinder, a semi-sphere or a flat plane (among other choices), which informs the control strategy and resultant beam spread. (Ex.2040, ¶¶80-87.) The shape and form of the purported two-dimensional array of LEDs affects how light is mixed from above/below and side-to-side due to overlapping regions and thus impacts the control strategy. (*Id.*) Indeed, while addressing Alden during his deposition for this and related proceedings, Petitioner’s expert was unable to provide details regarding the hypothetical structure or the corresponding impact and avoided addressing

these issues in his second declaration. (See Ex.2041, 56:25-57:11, 108:11-109:5, 112:19-113:18; Ex.2066, 35:14-36:22, 38:16-41:3, 44:14-45:12, 47:1-48:5; *see also* IPR2023-01034, Ex.1010, ¶¶23-29.)

Given the lack of a clear disclosure and key gaps in how the hypothetical structure would be put together and then operate, at best Petitioner identifies ambiguities as to how Figure 5 should be interpreted—which establish that Petitioner has failed to meet its burden of proof. *Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1284 (Fed. Cir. 2017). Prior art must be viewed as it is written and as it would be understood by persons in the field of the invention—not as it might have been written to describe a different development. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 851 F.3d 1270, 1274-75 (Fed. Cir. 2017) (This court's precedent "does not permit the Board to fill in missing limitations" even **if** "a skilled artisan would immediately envision them.") (citation omitted).

Petitioner's remaining arguments are equally flawed. Petitioner points to Alden's use of the term "array," but fails to appreciate that an "array" can have a single row. Petitioner also contends that because the CPU logic of figure 4 has X/Y coordinates, that logic, imported into Figure 5, requires X/Y coordinate analysis. (Reply, 3.) However, the logic flow of Figure 4 can still apply without **necessarily** requiring that the Figure 5 LED array have X/Y coordinates—a POSITA would be

skilled enough to realize that row-based differentiation is not needed with the Figure 5 one-dimensional array and simply analyze sensor elements for the single row—since the single row of LEDs is all that is actually **taught**. And that is notwithstanding the fact that, as noted above, Alden does not teach that the sensor logic or switch configuration is imported, only that the “control of switches” is imported—i.e., control low power to “glare reduction” zones, and high power everywhere else. (Ex.1005, ¶[0029].)

Next, Petitioner argues that Figure 5 should not be limited to that which is depicted, because the specification does not expressly limit Figure 5 to a single “row” of LEDs. (Reply, 5.) Turning the doctrine of anticipation on its head, under Petitioner’s logic, absent expressly limiting language, a depiction is a nose of wax, that can be stretched as needed to make an anticipation argument. Here, as Petitioner’s expert confirms, neither Figure 5 nor the associated description clearly establishes the structural features for a two-dimensional array and how any such features would be put together. (Ex.2041, 119:9-22.) And, while Alden does not say “row,” it does say “on **a** curve along **the** focal point”—i.e., a row. (Ex.1005, ¶¶[0029], [0047].)

Finally, Petitioner incorrectly relies on functions ascribed to Alden’s third embodiment, depicted in Figures 11-13: “its ‘segmented light distribution elements’ can perform ... ‘directing light to look around corners,’

‘concentrate[ing] light to look uphill,’ and ... ‘downhill.’” (Reply, 3.) Alden does not show the elements of Figure 5 having the requisite “steering” capability and Petitioner does not explain how fixed, unsteerable LEDs can be used to “concentrate” light in any manner.

Petitioner also points to the boilerplate in ¶[0061] as evidence that Figure 5 is able to “direct”/“concentrate” light—fairly read, those statements are limited to “segmented elements” in embodiments that can actually direct/concentrate light—a function never ascribed to Figure 5 by Alden nor proven by Petitioner. (Reply, 18-19.)

Petitioner’s anticipation proofs for independent claims 1, 20 and 26 are thus deficient.

IV. Independent Claim 1

A. Element 1D

The Reply does not cure the underlying defect, as it fails to explain how power flows from multiple switches of the array from Figure 3 into the nine LEDs of Figure 5. (Reply, 6-7.) Neither PO nor the Board can or should fill in the missing explanation.

B. Element 1F

The claims require two discrete determinations—“subsections” (1C) and “illumination **for** those subsections” (1F). Petitioner pointed to area 75 for the

former (Pet., 18.) and expressly stated “area 75 indicates the areas ... which will **cause** portions of the left headlight to be dim while a non-shaded left circuit area 77 represents the portions ... which will be on high beam.” (*Id.*) Per Alden and Petitioner’s explanation, once area 75 is determined, power is simply controlled to create low or high light, there is no need for the processor to make any “determination” of illumination. (Ex.1005, ¶¶[0027], [0045]; Pet., 17-18.)

Petitioner expressly states that Alden will not use any illumination level between low and high. (Pet., 25, FN 6.) On Reply, Petitioner now modifies element 107 to add untaught logic. (Ex.1005, ¶[0028]; Reply, 18.) There is nothing in element 107 that says **use** the distance data to “determine the intensity of light that will be produced by the 61 in the corresponding sectors.” While that quote is in a different portion of Alden (Fig. 3), the alleged function does not show up anywhere in the description of Figure 4. Instead, the description of Figure 4 (the functional logic) recites the following (about distance):

A triangulation process 105 is used to determine distance of each object. The location of objects is used to calculate **which zones of each headlight need to be dimmed** in a calculate headlight dim zones process 107. Signals are sent to each of the headlight control circuit zones that need to be dimmed to restrict the amount of current to the corresponding headlight zones such that they are dimmed in a

dimming process 109. Zones which are not dimmed remain on high beam.

(Ex.1005, ¶[0028].)

It is clear from the description of the underlying logic that the distance data is used for zone calculation. Once the “dim zones” are calculated, Alden **teaches** “[s]ignals are sent to each ... zones that need to be dimmed to restrict the amount of current ... such that they are dimmed” (*Id.*) Moreover, Petitioner expressly relies on binary control for its proofs—meaning that there is no gradient illumination. (Pet., 25, FN 6.)

Petitioner’s contention that “[t]he claims only require determining illumination, and not any particular way it needs to be done[,]” (Reply, 9) completely glosses over the point and further, leaves out part of the limitation. While there is not a requirement of a particular way to determine illumination, there **is** a requirement that the processor **determine illumination for a subsection**. Alden determines a subsection (to use Petitioner’s construction) and then simply controls the power to that section to low, it never determines the illumination for that section because it does not have to—once it “determines the zones” as Petitioner explains it, it is done with its determinations, and it simply controls power according to the fixed strategy.

V. Independent Claim 20

Petitioner argues that Alden’s system provides “‘a second intensity ... of illumination *where no vehicle is detected*[,]’ Alden [0025.]” (Reply, 10.) The Reply explains: “[t]his is done using a process that detects where light from vehicle headlights is above a threshold and accounts for an area around the headlights where the vehicle’s driver may be to determine where the other vehicle is present.” (*Id.*) That statement reveals the issue—to address glare, the area around the headlights **is** designed to encompass the driver but is **not** used to “determine where the other vehicle is present.” Nothing about the preceding teaches or suggests “processing sensor data to **determine** a subsection not including the vehicle” as claimed.

The “proof” for this limitation was a citation to 1[E] and 1[F] (Pet., 31), which is fatally deficient because this element is not within the language of 1[E] or 1[F]. The explanation that “Alden similarly determines where other vehicles are not present—areas where threshold light is not detected and which do not fall within the areas around sensed headlights where a driver might be present[.]” (Reply, 10) is both a new argument presented on Reply and wrong. Petitioner fails to demonstrate (and does not even contend) that Alden draws the bounding box large enough to exclude the totality of a vehicle. Indeed, Alden has no ability to demarcate the vehicle contours and draw a bounding box around those contours. Thus, Petitioner attempts to create a false equivalence between drawing the box

large enough to encompass a driver's face and the entire vehicle. In the context of claim 20, the two are not the same.

Finding this teaching present in Alden simply because the second subsections happen to not include vehicles in some instances would eviscerate the [20E] “determination” requirement. Under Petitioner's reading of claim 20, if a reference determines a first subsection including a detected vehicle under [20D] it automatically determines a second subsection not including the detected vehicle—stripping [20E] of any meaning. “Claim construction ‘must give meaning to all the words in [the] claims.’” *Sci. Applications Intl. Corp. v. United States*, 154 Fed. Cl. 594, 617 (2021) (quoting *Funai Elec. Co., Ltd. v. Daewoo Elecs. Corp.*, 616 F.3d 1357, 1372 (Fed. Cir. 2010)). As in *Sci Applications*, Petitioner's proof and their implicit construction would improperly “destroy the distinction” between [20D] and [20E]. Petitioner's failure to prove [20E] independent from [20D] is fatal.

VI. Independent Claim 26

Claim 26 also requires “determining illumination” for various subsections that both include and do not include the vehicle. For at least the reasons noted with respect to [1F], Petitioner does not demonstrate that Alden does this—and, in fact, explains that Alden has no need to make the claimed illumination determination because the emission for a given section is predefined and is simply applied once the shape of the section is known. (*See* § IV.B., *supra*.)

VII. Dependent Claims 2 and 4

As Petitioner notes, limitation 2[B] requires that “**each** light source has ‘a ... characteristic dependent on power.’” (Reply, 13.) Limitation 2[C] however refers to “**the** light source characteristics,” not “light source characteristics,” (without “the”) as Petitioner contends. (*Id.*) Use of “**the**” in 2[C] denotes a **collective** reference to **the** characteristic of “each light source” from 2[B], forming plural “characteristics.” Thus, 2[C] derives antecedent basis from 2[B], the only characteristic ever recited in the claim—a characteristic that is dependent on power. Yet, Petitioner reads “claim 2 in context with claim 4 ... “as claim 4 recites light modifying elements that can control characteristics not dependent on power.” (Reply, 13.) In doing so, Petitioner not only misapplies claim construction fundamentals but ignores the recitation of “**further** comprises” in claim 4, which means that the modifying elements can **also** include at least one of the enumerated items, not that the modifying elements **are one of** the enumerated items.

Claim 2 recites a certain type of characteristic belonging to “each” light source, and references “**the** characteristics,” requiring that **the previously recited** characteristics are controlled by a light modifying element. Claim 4 then **adds** an aspect to the light modifying element—it does not change the requirements of claim 2.

So, for example, if there is a “static light guide” per Petitioner’s contentions,

that has to be an **additional aspect of** a light modifying element that **also** still meets the requirements of claim 2— that the element can control the characteristic dependent on power—i.e., intensity, wherein the “light modifying element[s] can control intensity **and** includes a static light guide.” Claim 4 does not change the meaning of claim 2 to prevent Petitioner from having to show, for claim 2, both of the “light modifying elements” controlling a light source characteristic “dependent on power” and “control of ... the light modifying elements.” Petitioner shows neither, as it relies on uncontrolled lenses for its proof of the light modifying element limitation.

Petitioner’s secondary argument that “lenses” control light source intensity ignores the last limitation of claim 2, which calls for “control of the light sources and light modifying elements.” (Reply, 13-14.) Because lens control in Alden is only achieved with bi-refractive elements, not present or combinable (*See* POR, 46) with the LED embodiment in Figure 5, Petitioner’s 2[D] proof fails.

In a final obviousness variation, Petitioner argues that Alden’s “headlight could include a light source with a variable refractive element at either end” (Reply, 14-15.) Because this configuration (the addition of one element at each end) is new and devoid of Petition support, it is impermissible. (Pet., 41-43.) Moreover, because Petitioner neither addresses the fact that the variable light element array relies on collimated light nor provides any evidence that LEDs

produce collimated light suitable for use with such an element, Petitioner's obviousness argument also fails.

VIII. Dependent Claim 3

Like claim 2, Petitioner's claim 3 anticipation argument fails as it misinterprets the plural "light source characteristics" limitation. (*See* § VII., *supra*.) Even if Petitioner is correct that the "variable light modifier circuitry" of claim 3 is only conditionally required, its proof reveals the fallacy of its inclusion of the "refractive" elements with the Figure 5 embodiment. Petitioner expressly notes that the "variable refractive element **includes a circuit ...**" (Reply, 16.) Because Petitioner is already using the switch array to control the intensity of lights in the Figure 5 example, simply adding a controllable circuit, without ever explaining what would control it, how, or when, is inadequate for either an anticipation or obviousness proof.

IX. Dependent Claim 11

Petitioner's statement that "Alden's CPU 'checks the status of each respective sector 89 of the light sensors,' assesses whether the detected light is 'above a *threshold* intensity or distance' such that it indicates 'two headlights of [an oncoming vehicle] 41,' and correspondingly determines 'which zones need to be dimmed'" (Reply, 16-17) fails for at least three reasons.

First, as the disconnected quotation marks establish, Petitioner's proof is a

fictitious teaching derived by stringing together partial sentences from different portions of Alden to improperly imbue function. On review, Alden simply states that its system detects two headlights of a vehicle, i.e. the system **can** detect light from such emission sources—the system never “assesses” the intensity of the detected light “such that” it establishes that the light originates from a vehicle. (Ex.1005, ¶[0027].)

The reference to “above a threshold intensity or distance” is from ¶[0028], a full paragraph **after** reference to the “two headlights” and never presented as the predicate for determining that something is a vehicle. The language of the specification only mentions “threshold” once—and properly understood, it teaches that the system responds to light, detected above the threshold in a given sector, by reducing light to that sector. Ultimately, the system does not care if the light is from a vehicle or not, but that does not mean that the system “determines” all sensed threshold light to be vehicles, it means that the system responds to all sensed threshold light. It certainly does not mean that the processor of Alden is “configured to use the sensor data and ... [an] algorithm[] to identify ... vehicles,” as claimed. (POR, 52; Ex.2040, ¶224.)

X. Dependent Claims 15 and 21

Petitioner contends that “[t]o distinguish between different objects, such as roadside reflectors or oncoming vehicles, a POSITA would have understood that

the threshold intensity or distance of the process in Figures 3-4 may, for example, simply be adjusted based on object type.” (Reply, 17.) This is a completely new theory of “object detection” never advanced in the Petition. Moreover, Petitioner’s expert expressly stated in his deposition that the reflectors would “have the same appearance” on the sensor array as headlights and that they would be detected “using the same logic.” (POR, 47-49.)

This “adjusted threshold” notion is also utterly unsupported by Alden either expressly or by inherency and further makes no logical sense. It assumes that vehicles emit light at a first intensity and that reflectors reflect at a lesser intensity. However, a nearby roadside reflector reflecting high-beam emission may appear just as bright as a vehicle using low beams. There is no singular threshold that would accurately differentiate between headlamps and sign reflection, especially if you factor in the potential impact of other vehicles on the reflective signs—i.e., a second preceding vehicle would add light to the signs and/or could cause them to be illuminated more brightly based on additional reflected illumination. If multiple intensity thresholds were used, then as a vehicle traveled closer to a sign, the sign would appear brighter, and, at some point, the brightness would cross the second threshold and the emitting vehicle would suddenly treat the sign as an approaching vehicle. Similarly, low-beam emitting vehicles would first appear as “curves” (being above the first threshold and below the second) and would cause random

shifts of the pattern of light until they got close enough that their lights were above the second threshold.

A. Claim 15

Petitioner argues that Alden does not always default to emitting high beams everywhere and that Alden “can be used for ‘many applications.’” (Reply, 18.) If the proof of claim 15 is based on an **alternative** system of Alden (one that does not respond to traffic) the proof must fail. The proof of claim 15 is based on the proof of claim 1. Claim 1 is a system that utilizes the control logic of Figure 5—to emit high beams everywhere possible. Petitioner (and Alden) said as much. (*See e.g.*, Pet., 31-32.) Therefore, the system upon which the proof of claim 15 is built **is** a system that already emits high beams everywhere as a “default” state, contrary to Petitioner’s new contentions in the Reply. (Reply, 18.)

B. Claim 21

This argument suffers from the same issues as the Reply argument for claim 15 above. (*See* § X.A., *supra*.) Namely, the claim cannot distinguish between vehicles and reflectors, and thus a single functioning system that accommodates **both** situations cannot exist. And, as with claim 15, claim 21 depends from a base-system that automatically uses high-beam illumination for the full lamp, which: a) illuminates the curves; and b) leaves nothing left to “increase” per the claim. (POR, 57-59.)

XI. Dependent Claims 16-17, 22-23, 32-36

Petitioner is not entitled to treat “curves” and “turns” as having the same meaning unless the Petition provided evidence to overcome the presumption of claim differentiation, which it did not. (POR, 61-62; Pet., 54-56.) Absent evidence to the contrary, courts will attach different meanings and scope to different words used in different claims. *See Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1369-70 (Fed. Cir. 2007); *In re Rembrandt Techs., LP*, 496 F. App’x 36, *45 (Fed. Cir. Sept. 13., 2012) (unpublished) (internal citations omitted); *Seachange Int’l, Inc. v. C-COR Inc.*, 413 F.3d 1361, 1368-69 (Fed. Cir. 2005) (internal citations omitted). It was Petitioner’s burden to explain why “curves” and “turns” should have the same meaning, which Petitioner never did. This is a fatal flaw in particularity that cannot be rectified upon reply, and attempting to address it on reply constitutes an impermissible introduction of a new issue. (POR, 61-62.) *See Microsoft Corp. v. IPA Techs. Inc.*, No. 2021-1412, 2022 WL 989403, at *6-7 (Fed. Cir. April. 1, 2022) (unpublished).

XII. Dependent Claims 5 and 28-29

Petitioner improperly relies on colored LEDs from Harbers. (Pet., 61.) Harbers’ colored LEDs are not tinted white-light LEDs, they have actual colors. Since each LED in Figure 5 has responsibility for a single sector, a vehicle within a given sector would see the light color associated with that LED, i.e., red, blue,

green, etc.

And, if there were 9 LEDs in the array as Figure 5 teaches then 1/9 of the field of view would have a color-shift to a different spectrum for each LED that was replaced with a colored LED.

XIII. Dependent Claim 6

Petitioner is completely wrong about it being irrelevant that Bergkvist does not include LEDs. (Reply, 22.) Bergkvist has to somehow provide emission of UV light usable in combination with the Alden reference.

In the Petition, Petitioner said “a POSITA would have been motivated to include at least one UV light source **in the array of Alden ...**” (Pet., 69.) As noted above for claim 5 (*See* § XII., *supra.*), each light source in the array of Alden has specific responsibility for a sector. Putting a UV LED (if such a thing even existed, which is not something Petitioner ever explains) in the place of a normal LED would deprive that sector of all visible light.

On Reply, Petitioner changes its argument, generally contending that Alden can include UV light output without really explaining how that would occur. (Reply, 22-23.) Petitioner further states that “such [a] light source would include a filter to remove all the visible light ...” (Reply, 23.) Bergkvist however does not have a light source that includes a filter (nor an LED source); the filter is placed elsewhere. (Ex.1007, Abstract.) Petitioner never explains where the source would

be placed, where the filter would be placed, or any other aspect of the combination. Ultimately, Petitioner's argument lacks sufficient explanation to meet their burden.

XIV. Dependent Claim 8

Petitioner contends that there is no evidence in the record that there is markedly different intensity between headlights and taillights. (Reply, 23.) On Reply, Petitioner proposes the use of multiple thresholds with no support from either reference—neither Alden nor Beam teach the use of multiple different intensity thresholds. (Reply, 23-24.) As noted in the POR, simply because Beam can function with a lower threshold does not mean that Alden can. As such, Petitioner needed to explain the effect lowering the threshold would have on how brighter sources (such as headlamps) are differently represented, and why this was not an issue. (POR, 69.)

XV. Conclusion

All of Petitioner's anticipation proofs suffer from the base deficiency of relying on a combination that is an unexplained modification of Figure 5, which is non-functional as presented and is outside the scope of anticipation. Additionally, the proofs are individually deficient for the reasons cited. It was Petitioner's burden to specifically lay out its contentions in the Petition. Absent a countervailing reason, which does not exist here, Petitioner's proofs cannot be bolstered by new theories and arguments on Reply. As a matter of law, PO is

entitled to a presumption of validity, and the proofs, as presented, circumscribe
Petitioner's arguments throughout the proceeding.

Dated: August 14, 2024

Respectfully submitted,

/ Sangeeta G. Shah /
Sangeeta G. Shah (Reg. No. 38,614)
David S. Bir (Reg. No. 38,383)
Bernard P. Tomsa (Reg. No. 60,121)
Jeffrey M. Szuma (Reg. No. 35,700))
BROOKS KUSHMAN P.C.
150 W. Second St., Suite 400N
Royal Oak, MI 48067-3846
(248) 358-4400

Attorneys for Patent Owner

Certificate of Service

The undersigned hereby certifies that on August 14, 2024, a complete and entire copy of **PATENT OWNER SUR REPLY**, was served via electronic mail to the attorneys listed below:

LEAD COUNSEL	BACK-UP COUNSEL
Celine Jimenez Crowson (Reg. No. 40,357) HOGAN LOVELLS US LLP 555 13 th Street, N.W. Washington, D.C. 20004 Telephone: (202) 637-5600 Facsimile: (202) 637-5910 Celine.crowson@hoganlovells.com	Joseph Raffeto (Reg. No. 66,218) Scott Hughes (Reg. No. 68,385) Ryan Stephenson (Reg. No. 76,608) 555 13 th Street, N.W. Washington, D.C. 20004 Telephone: (202) 637-5600 Facsimile: (202) 637-5910 joseph.raffeto@hoganlovells.com scott.hughes@hoganlovells.com ryan.stephenson@hoganlovells.com

Respectfully submitted,

/ Sangeeta G. Shah /
Sangeeta G. Shah (Reg. No. 38,614)
David S. Bir (Reg. No. 38,383)
Bernard P. Tomsa (Reg. No. 60,121)
Jeffrey M. Szuma (Reg. No. 35,700)
BROOKS KUSHMAN P.C.
150 W. Second St., Suite 400N
Royal Oak, MI 48067-3846
(248) 358-4400

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Respectfully submitted,

Dated: August 14, 2024

/ Sangeeta G. Shah /
Sangeeta G. Shah (Reg. No. 38,614)
David S. Bir (Reg. No. 38,383)
Bernard P. Tomsa (Reg. No. 60,121)
Jeffrey M. Szuma (Reg. No. 35,700)
BROOKS KUSHMAN P.C.
150 W. Second St., Suite 400N
Royal Oak, MI 48067-3846
(248) 358-4400

Attorneys for Patent Owner