

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Mercedes-Benz USA, LLC,
Petitioner,

v.

Yechezkal Evan Spero,
Patent Owner.

Case No. IPR2023-01040
Patent 9,955,551

**PETITIONER'S REPLY TO
PATENT OWNER'S RESPONSE**

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PETITIONER’S EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 9,955,551 (“’551”)
1002	Original File History for the ’551 Patent
1003	Declaration of Dr. Nikolaos Papanikolopoulos
1004	Curriculum Vitae of Dr. Nikolaos Papanikolopoulos
1005	U.S. Patent Publication No. 2003/0,137,849 (“ Alden ”)
1006	U.S. Patent No. 6,049,749 to Kobayashi (“ Kobayashi ”)
1007	U.S. Patent No. 6,144,158 (“ Beam ”)
1008	WIPO Patent Publication No. 2001/070538 (“ Stam ”)
1009	PTAB Trial Statistics April 2023 IPR, PGR
1010	Reexamination File History for the ’551 Patent
1011	Patent Owner Disclaimer under 37 C.F.R. 1.321(a)
1012	Reissue File History for the ’551 Patent
1013	Deposition Transcript of Dr. Matthew Turk

I. Introduction

Patent Owner's Response ("POR") is a request for the Board to ignore the teachings of Alden in its entirety, take the Petition out of context, and view demonstrative figures which accurately illustrate what Alden (EX1005) discloses as precise technical schematics which, if not perfect in scale, allegedly show Alden does not disclose the claimed invention. But, as explained below and in the Petition, when the disclosures of Alden are properly considered in view of the entirety of the reference, it is clear Alden contains more than sufficient disclosure to invalidate the challenged claims. Patent Owner's arguments are nothing more than attempts to distract from Alden's concise and clear disclosure of the challenged claims, and should be dismissed. Petitioner addresses each of Patent Owner's arguments below.

II. Alden's Invalidating Disclosure Is Presumed Enabled (and Is Enabled), and Patent Owner Has Failed to Carry Its Burden to Prove Otherwise

Given how closely Alden tracks the challenged claims, Patent Owner focuses most of its Response on a sweeping argument that Alden fails to *enable* its own disclosure and thus cannot be an invalidating reference. (POR, 24-29.) This argument fails for several reasons.

First, while Patent Owner is unclear as to what legal standard it applies in its “enablement” arguments,¹ what is clear is that Patent Owner omits multiple, significant aspects of the actual enablement standard. Disclosures in prior art publications are *presumed* enabled. *In re Antor Media Corp.*, 689 F.3d 1282, 1287-88 (Fed. Cir. 2012); *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 (Fed. Cir. 2003). And Patent Owner, not Petitioner, bears the burden to show non-enablement. *Id.* Patent Owner must specifically show that “undue experimentation would be required [for a POSITA] to perform the claimed invention based on the teachings in [Alden].” *Antor*, 689 F.3d at 1289.

Second, Patent Owner clearly fails to show non-enablement of Alden. Instead of meeting its burden, Patent Owner relies on vague, conclusory statements that

¹ At times, for example, Patent Owner seems focused on whether Alden enables its own figures and specific disclosures, rather than whether it enables the challenged claims. (POR, 27-28.) Patent Owner also relies on testimony from its expert, Dr. Matthew Turk, but at his deposition Dr. Turk was unsure about the standard for enablement and what would be considered “undue” experimentation, indicating that his (incorrect) understanding is based on “applying for patents” and what the patent office requires for something to be issued as a patent. (Deposition Transcript of Dr. Matthew Turk (“Turk Depo.”) (EX1013), 46:8-23.)

Alden is “ambiguous” and does not provide “sufficient precision and detail.” (*See, e.g.*, POR, 26, 28.) Neither Patent Owner nor its expert discuss *any* experimentation required to perform the claimed invention based on Alden’s teachings, much less why such experimentation would be undue.² (Turk Depo., 31:23-32:21, 33:4-8.) This alone is fatal to Patent Owner’s argument. In fact, Patent Owner does not discuss any of the recognized factors considered in determining whether a disclosure would require undue experimentation. *See In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988); *see also, e.g., Array Biopharma Inc. v. Takeda Pharm. Co. Ltd.*, IPR2015-00754, Paper No. 82 at 48 (PTAB Feb. 14, 2019) (finding arguments a prior art reference was non-enabled unpersuasive where relevant factors were not addressed and no explanation of what would be “undue” experimentation provided); *SNAP, Inc. v. SRK Technology LLC*, IPR2020-00820, Paper No. 46 at 54-56 (January 9, 2020).

Further, Patent Owner’s suggestion that a letter from Gentex to Alden indicates Alden’s disclosure is “theoretical” and thus “supports” non-enablement of Alden should be given little to no weight. (POR, 18, n. 3.) This letter from the file

² The unsubstantiated, conclusory opinions of Dr. Turk which largely mirror the unsubstantiated attorney argument in the POR should be given little to no weight. 37 C.F.R. § 42.65(a).

history of Alden is being taken out of context, and there is no indication in the record regarding the circumstances surrounding the submission to Gentex, the type of review done, what Gentex was looking for, or why it responded as it did. (Turk Depo., 82:13-85:1.)

Third, setting all this aside, as explained in the Petition and by Dr. Papanikolopoulos, it is clear how Alden's system would work, and Patent Owner is misreading Alden to create alleged ambiguities where there are none. For example, Patent Owner argues Alden "specifically states that *the switch arrays* of the light control circuits 55a, 55b shown in Figure 3 *are* merely for '*illustrative purposes*.'" (POR, 29 (emphasis added).) But what Alden actually says is the "*shaded areas* of 55a and 55b are for illustrative purposes, in practice one can not look at a switch array matrix and tell which areas are in which state." (Alden, [0027]; Turk Depo., 107:13-18) That is, Alden does *not* say that its switch array is for illustrative purposes as Patent Owner claims, but rather just says the shaded areas added to the arrays in Figure 3 are illustrative to show different switch states.

When read properly, Alden contains more than enough details regarding the physical components of its system, computer logic that controls these components, and how the system works to have a sufficiently enabling disclosure with respect to

the challenged claims. Each of Patent Owner's arguments that Alden does not invalidate the claims because it is allegedly not enabled must fail.³

Regarding "all grounds," Patent Owner argues non-enablement based on its assertion Figure 5 is limited to a headlight with a single row of LEDs. (POR, 24-26, 29, 34-36.) Patent Owner then argues a POSITA would not understand how to use this single row of LEDs with the two-dimensional switch array of Figure 3. As the Board correctly found in its Institution Decision, however, Patent Owner is wrong. (Institution Decision ("DI"), 17-18.)

Alden is clear Figure 5 is *not* limited to a single row of LEDs. Nowhere does Alden call the LEDs a "row" or indicate they are "one dimensional." Instead, Alden discloses Figure 5 illustrates "the segmented headlight" comprised of an "*array*" of lighting elements. (Alden, [0029], Figure 5.) Figure 5 is simply a sectional view of one row of LEDs in this array. (DI, 15; Deposition Transcript of Dr. Nikos Papanikolopoulos ("Papanikolopoulos Depo.") (EX2041), 57:22-59:12, 106:22-107:10, 110:7-19.)

³ For these same reasons, Patent Owner is incorrect that Alden must be "modified" to meet the claims. (*See, e.g.*, POR, 26.) Rather, properly reading Alden's disclosure in its entirety demonstrates that the claims are invalid over Alden with no modifications necessary.

Alden is replete with disclosures that further confirm a POSITA would understand Figure 5 to include multiple rows of LEDs. For example, Figures 6-7 both show (a) a “sectional” view of one row of lighting elements and (b) a “front-on” view depicting the full two-dimensional array of elements within the headlight. (Alden, Figures 6-7.) Similarly, Figure 5 shows a sectional view of a row of LEDs to illustrate the segmented lighting, with it being understood the full array in the front-on view (again, such as similarly shown in Figures 6-7) would be two-dimensional. (Petition, 15-16, 34-35; Alden, [0029]; Papanikolopoulos Depo., 57:12-16; Declaration of Dr. Nikolaos Papanikolopoulos (“Papanikolopoulos Decl.”) (EX1003), ¶¶65-70.)

Additionally, in discussing Figure 5, Alden explains the “array” of LEDs is controlled by corresponding switches from a switch array using the “CPU and logic *previously described*.” (Alden, [0025].) As even Patent Owner’s expert admits, this “CPU and logic previously described” refers to Figures 3-4 and their corresponding descriptions. (Turk Depo., 122:12-22.) Alden’s Figure 5 cannot be viewed in the abstract, but rather must be read in connection with the descriptions of Figures 3 and 4 as well. Because Figures 3-4 disclose the CPU and logic selectively providing high beam and dimmed low beam light in different sectors across a two-dimensional plane, a POSITA would understand Figure 5 to likewise use multiple rows of LEDs. (Alden, Figs. 3-4, [0027]-[0028]; Papanikolopoulos Decl., ¶¶65-70, 83.)

As a further example, Figure 4 discloses the CPU logic compiling two-dimensional (XY) sensor maps of the detected light and determining dimmed and high beam zones *within this XY space*. (Alden, Figure 4, [0028]; Papanikolopoulos Decl., ¶¶60-62, 65-70.) For this logic to apply to Figure 5, as Alden expressly says it does, a POSITA would understand a two-dimensional array would be used. (Papanikolopoulos Depo., 57:12-60:18; Papanikolopoulos Decl., ¶¶60-62, 65-70, 83.) In particular, where Alden discloses that the LEDs “are on a curve along the focal point of a headlight lens 121 such that the light from each lighting element goes into a specified portion (or portions) of the headlight distribution area,” Alden is describing directing light into different sectors of a two-dimensional plane in front of the vehicle, and as such it is again clear Alden discloses multiple rows of LEDs along the focal point of a curved surface behind the lens to accomplish this. (Alden, [0029]; Papanikolopoulos Decl., ¶¶54-55, 58, 73-75; Papanikolopoulos Depo., 53:2-12, 57:7-61:5, 106:22-107:10, 110:7-19, 115:7-116:6.) If the LED array were one-dimensional as Patent Owner alleges, then it could only correspond to X locations, and not the plurality of XY locations that Figure 4 and Paragraph [0028] of Alden indicate must be accounted for. (Alden, Figure 4, [0028]; Papanikolopoulos Depo., 52:18-53:1; 57:12-60:18.)

As a final example, Alden discloses additional functionalities its “segmented light distribution elements” can perform, including “directing light to look around

corners,” “concentrat[ing] light to look uphill,” and “concentrat[ing] light to look downhill.” (Alden, Figs. 11-13, [0036]-[0038].) In these paragraphs, Alden discloses that it is the “segmented light distribution elements described herein” (which would include those of Figure 5) that can perform these functions, not just the lighting elements of any particular embodiment. (*Id.*) For Alden’s Figure 5 LEDs to direct light uphill and downhill, for example, there must be multiple rows of LEDs with some angled and positioned on the curved surface to direct light upwards and others angled and positioned to direct light downwards. (Papanikolopoulos Decl., ¶49.)

In sum, when considering Alden’s full disclosure, it is clear Figure 5 is not limited to a single row of LEDs.⁴ Patent Owner’s arguments that Alden is not enabled, or must be modified, with respect to the challenged claims therefore fail.

III. Independent Claim 48: Alden Discloses “Classifying” Objects, and Petitioner Does Not Mischaracterize Alden by Annotating Figure 5

⁴ Patent Owner’s additional arguments that a POSITA would not understand how to use a switch array like in Figure 3 with the LEDs in Figure 5 are easily dismissed. (POR, 27-28.) Alden is clear that the switch array should have one switch for each LED, as even Patent Owner’s expert admits. (Alden, [0029]; Papanikolopoulos Decl., ¶58-59; Turk Depo., 121:3-18.)

Regarding claim 48, in addition to its enablement arguments addressed above, Patent Owner argues Alden does not disclose “classifying objects” and that Petitioner mischaracterizes Alden. (POR, 29-31, 37-39.) Both arguments fail.

A. Alden Discloses “Classifying” Objects

Patent Owner argues Alden does not disclose “classifying” objects because, according to Patent Owner, Alden merely detects incoming light and then “*assumes*” of the existing of an oncoming vehicle. (POR, 29-31.) Patent Owner is wrong on the art and the law.

Alden unequivocally discloses “classifying” objects, including oncoming vehicles. A key purpose of Alden is to “sense the locations of *other vehicles*” and control the headlights *in response* to the “sensed vehicle[s].” (Alden, [0006]; *see also* [0008], [0003]-[0005], [0025]-[0029]; Papanikolopoulos Decl., ¶51.) Alden does not simply assume detected light is an oncoming vehicle. Rather, its 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.”⁵ (Alden, [0027]-[0028]; *see also* Petition, 25-29.)

Patent Owner speculates that Alden could erroneously classify “streetlights” or “house lights” as vehicles if their light were above threshold(s) used by the Alden CPU. (POR, 31.) It is unclear how these objects could be traveling on a road, but in any event this irrelevant. Claim 48 does not require a particular method to classify objects or level of accuracy. Regardless of whether Alden could at times, theoretically, classify a non-vehicle as vehicle does not mean Alden does not “classify” objects. “Prior art that sometimes explicitly meets the claim elements is sufficient to show unpatentability.” *Fitbit, Inc. v. Aliphcom, Inc.*, IPR2016-00714, Paper No. 27 at 22 (Sept. 13, 2017). *see also Hewlett-Packard Co. v. Mustek Systems, Inc.*, 340 F.3d 1314, 1326 (Fed. Cir. 2003).⁶

⁵ That Alden dims the area *above* “the headlight dots” of the oncoming vehicle because it may be “occupied by the driver” reinforces that Alden is “classifying” objects as vehicles. (Alden, [0027], Figure 3.) If it were not, there would be no need for this step.

⁶ Patent Owner proposes construing “classify” based on a portion of a dictionary definition. (POR, 28.) There is no basis to limit the claims in this way, but even

B. Petitioner Does Not Mischaracterize Alden by Annotating Figure 5

Regarding claim 48[j], Patent Owner repeats its arguments that Alden fails to enable using the switch array of Figure 3 with the LEDs of Figure 5. (POR, 33-37.) These “enablement” arguments are unpersuasive and fail for the reasons give above. *See supra*, Section II.

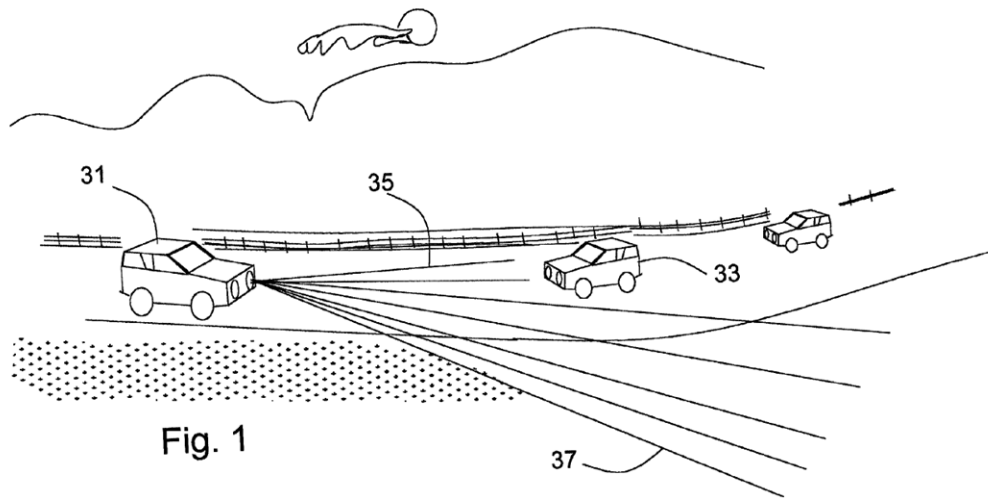
Additionally, Patent Owner argues Petitioner relies on inaccurately scaled annotations of Alden’s Figure 5 to contend Alden discloses the following: “control light emitted from the first cluster directed towards the first area to be different in at least one emission characteristic, based on the first light determination, from second light emitted from a second, different cluster of the LEDs, directed towards one or more illuminated second areas at a common elevation with the first area and laterally adjacent to the area.” (POR, 37-41.) Patent Owner argues Petitioner is only able to contend Alden teaches these limitations by rendering the width of that vehicle

under this definition, Alden still discloses “classifying” objects, as it arranges or groups something (*e.g.*, light source(s)) in classes (*e.g.*, vehicles and non-vehicles) based on a system or principle (*e.g.*, whether the intensity of detected light is above a threshold or distance).

disproportionally small relative to the size of the headlight. (*Id.*, 37-38.) This argument fails for at least two reasons.

First, Alden expressly discloses its headlight can select LEDs directing light to sectors containing other vehicles (first area) and control them so that they emit low beam light, while LEDs directing light to sectors with no vehicle present (second areas) can be switched to high beam. (Alden, [0027]-[0029], Petition, 34-36.) For example, when another vehicle is detected in the middle of the headlight distribution area (first area), Alden controls the light from LEDs directed at the sectors containing the other vehicle to be dimmed, while controlling LEDs directing light to second areas at a common elevation with the first area and laterally adjacent to that first area (*e.g.*, to the areas on each side of the oncoming vehicle) to have different, high beam illumination. (Alden, Figure 5, [0027]-[0029]; *see also* [0025]-[0026].) As another example, Figure 1 of Alden depicts a vehicle 31 equipped with a segmented headlight, which “emits a low beam illumination 35 in a first headlight distribution sector while concurrently emitting a high beam illumination 37 in a second headlight distribution sector.” (Alden, [0025].) As Alden explains, “[t]he low beam illumination in 35 [is] emitted in response to the detection of an oncoming vehicle 33,” and the high beam illumination 37 illuminates areas where no vehicle is detected. (*Id.*) It can be clearly seen from Figure 1 that the high beam 37

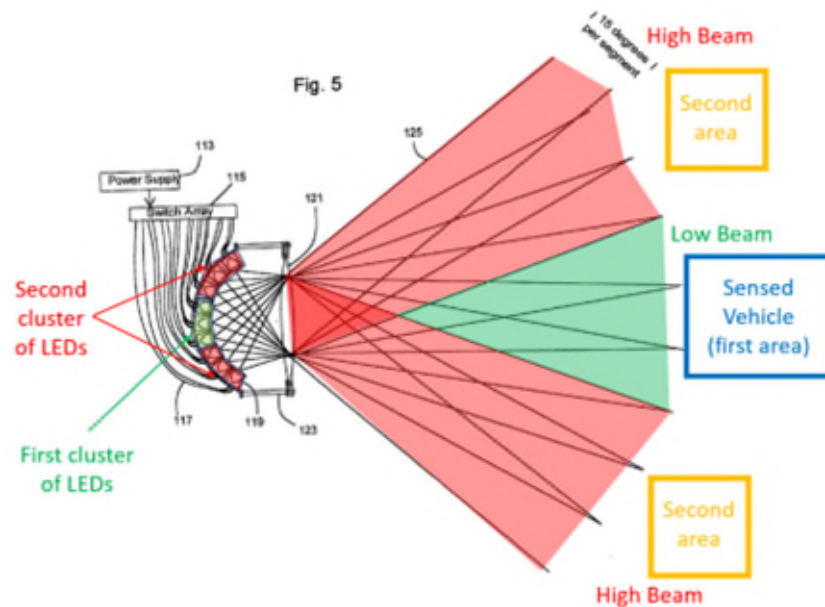
illuminates is emitted in sectors laterally adjacent to the sector in which low beam 35 is emitted:



(*Id.*, Fig. 1; *see also* [0026], Fig. 2 (disclosing high beam and low beam light in different laterally adjacent sectors at a common elevation; Petition, 35-36; Papanikolopoulos Decl., ¶¶77-78.)

Second, Patent Owner’s arguments also fail because Petitioner’s annotations to Figure 5 are clearly demonstrative of what is described in Alden, and are not the creation of a scaled technical drawing. (Papanikolopoulos Decl., ¶75.) “It is well established that patent drawings do not define the precise proportions of the elements.” *See Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000). Thus, it would make no sense to provide scaled annotations on top of the non-scaled patent drawings in Alden. Further, the annotations added to Alden’s figure accurately illustrate the *concept* as disclosed in Alden, *i.e.*, that light

sent to areas where a vehicle present is dimmed, while light sent to areas at a common elevation and laterally adjacent to areas containing the vehicle is switched to high beam. (Alden, [0027]-[0029].) The annotations are also consistent with the illustrations in other figures, such as Figures 1-2, as discussed above. Accordingly, annotated Figure 5 does not mischaracterize Alden, and accurately shows how Alden's disclosures meets the limitations of claim 48[j], with certain LEDs directing dimmed light towards areas containing another vehicle, and other LEDs directing high beam light to areas at a common elevation and laterally adjacent to the area with the vehicle as illustrated below:



(Alden, Figure 5 (annotated); *see also* Papanikolopoulos Decl., ¶¶77-78.)

IV. Independent Claim 56: Alden Discloses Reducing Intensity to Non-

Glaring Illumination In an Area With Another Vehicle Relative to Other Areas

Patent Owner's arguments regarding claim 56 merely repeat the same arguments made with respect to Alden allegedly being non-enabled and made with respect to claim 48. (POR, 41-42.) These arguments are unpersuasive for the same reasons as explained above. *See supra* Sections II, III.

V. Independent Claim 64: Alden Discloses Changing Position of Dimmed Area to Follow a Moving Vehicle

Patent Owner argues that Alden fails to teach the claim limitations in claim 64 of (i) “*control a first change to one or more characteristics of the light associated with the first cluster of the LEDs that is directed towards the other vehicle, that diminishes glare to a driver of the other vehicle when the other vehicle is at the first position*” and (ii) “*control a second, subsequent change, to one or more characteristics of the light that is subsequently directed towards the other vehicle, that diminishes glare to the driver of the other vehicle when the other vehicle is at the second position.*” (POR, 42-46.) Patent Owner first argues that Alden fails to teach these limitations for the same reasons as Claim 48 and 56, including that Alden does not describe these limitations “clearly” and “unambiguously,” and that Alden fails to enable these limitations. (*Id.*, 42-43.) For the same reasons discussed above, these arguments are unpersuasive.

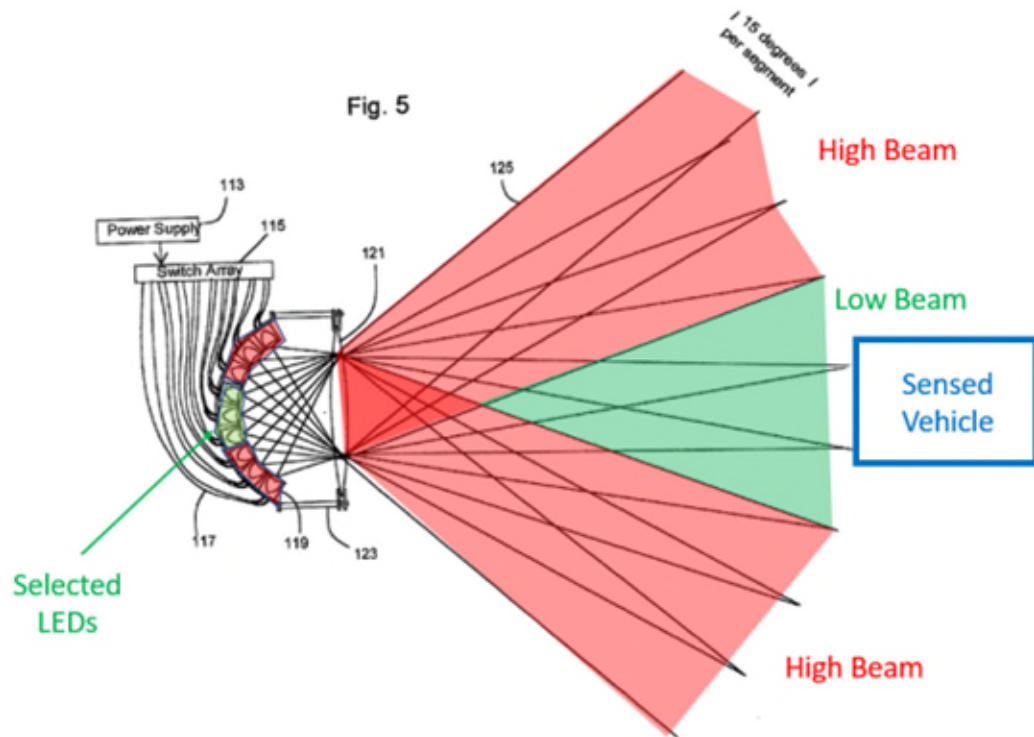
Patent Owner further contends Alden fails to anticipate claim 64 because Petitioner's annotations of Figure 5 are inaccurate and thus cannot be used to show that Alden teaches these limitations. (*Id.*, 43-46.) Specifically, Patent Owner argues the annotated vehicle in Figure 5 could not physically move from the first position to the second position, because it is shown at the same size at both locations. (POR, 44-45.) This ignores that, as correctly pointed out by the Board in its Institution Decision, annotated Figure 5 is, clearly, not a precisely scaled, technical schematic or meant to illustrate the precise size and distance of the oncoming vehicle. (Papanikolopoulos Decl., ¶75; D.I. 18-19.) Rather, annotated Figure 5 is simply meant to (and does) demonstrate Alden's disclosures of how its system reacts "in real-time" to detect locations of other vehicles and dim the light to sectors containing such vehicles over time. (Alden, [0026]-[0029]; Petition, 46-50; *see also supra* Section III.B.)

In particular, Alden discloses that the process of (1) collecting sensor data, (2) calculating the position of a detected oncoming vehicle based on the sensor data, (3) determining which zones of the headlight distribution area are directed towards the detected vehicle, and (4) controlling lighting elements directed to those zones to be dimmed is **iterative** "so as to be responsive to changing environmental conditions **in real time**." (Alden, [0028] (emphasis added); *see also* Petition, 47-50; Papanikolopoulos Decl., ¶¶100-102.) Thus, as the position of a detected vehicle

changes from a first to a second position, the system would detect this and react in real time to continue directing low beam light at the other vehicle to reduce glare. (Papanikolopoulos Decl., ¶¶100-102.) Patent Owner therefore fails to show that Claim 64 is patentable over Alden.

VI. Independent Claim 72: Alden Discloses Maintaining Dimmed Illumination at Detected Vehicles Relative to Laterally Adjacent Areas

Patent Owner argues Alden does not “vary illumination provided to the target by the selected cluster, relative to illumination provided to area laterally adjacent the target.” (POR, 46-48.) Patent Owner contends Petitioner’s annotated Figure 5 illustrates areas *immediately* adjacent to the sensed vehicle, or target, being illuminated with the same low beam light as the sensed vehicle:



(*Id.*) This overly narrow interpretation, that the dimmed light cannot extend even slightly outside the contours of the vehicle (*i.e.*, there can be no buffer), is not supported by the broader, plain language of the claim. All the claim requires is that illumination towards the target is varied relative to areas laterally adjacent to the target. In disclosing that sectors containing a sensed other vehicle, or target, are dimmed as compared to sectors adjacent those containing a sensed vehicle, Alden discloses this claim limitation. (Alden, [0027]-[0029]; Petition, 54-55; Papanikolopoulos Decl., ¶114.)

Patent Owner further argues that even if Alden discloses varying the illumination to areas containing a target relative to laterally adjacent areas, it

purportedly does not “maintain” this varied illuminance when “subsequent data indicates a change in position of the target relative to the motor vehicle.” (POR, 47-48.) Patent Owner argues Alden’s control function described in Figures 3 and 4 does not sufficiently describe how the system maintains the illumination variance between dimmed areas around the target vehicle, as compared to laterally adjacent sectors that are switched to high beam areas, as the target vehicle changes position. (POR, 47-48.) In making this argument, Patent Owner confusingly focuses on “sectors” in Alden, alleging the “array of Figure 9 has never been shown to be able to create and maintain the claimed variance of illumination, which is relative to the target, and not the sector.” (POR, 48.)

However, as the Petition explained, Alden discloses continuously collecting sensed data, calculating the position of a sensed oncoming vehicle (or “target”) based on that data, determining which portions of the headlight need to be dimmed or switched based on the new calculations, and adjusting the headlights accordingly. (Petition, 56.) The process is repeated “so as to be responsive to changing environmental conditions in real time.” (Alden, [0028]; Petition, 56; Papanikolopoulos Decl., ¶115.) Thus, as the sensed target vehicle changes positions, the sectors in which the vehicle is determined to be located are continuously dimmed, such that the sensed vehicle is always illuminated in low beam light, whereas laterally adjacent areas with no vehicle would be switched to high beam.

(*Id.*) As a result, variance of illumination between the target vehicle and laterally adjacent areas is maintained, as the target vehicle sectors are dimmed and laterally adjacent areas with no other vehicle are switched to high beam in real time. (*Id.*)

VII. Independent Claim 80: Alden Discloses Changing LED Light as a Sensed Vehicle Moves

Patent Owner’s sole argument regarding claim 80 is that the Petition does not “adequately demonstrate” the claimed change in light “occurs as the target moves.” (POR, 49-50.) However, this argument fails for the reasons given above regarding claims 48, 64, and 72 (*see supra* Sections III, V, VI), and further detailed in the Petition regarding claims 48[g], 64[l], and 72[m]. (Petition, 25-30, 50, 55-56.) Again, Alden is clear its system senses oncoming vehicles in “real time,” thus changing the light from LEDs in real time as the sensed vehicle’s position changes. (Alden, [0027]-[0029]; Petition, 58-59.)

VIII. Dependent Claims 50, 58, 66, 74, and 82: Alden’s Invalidating Disclosure is Enabling

Dependent claims 50, 58, 66, 74, and 82 recite “identify an upcoming road curvature” and “accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the at least one headlamps.” Patent Owner argues these claims are not invalid because Alden’s disclosure of sensing that a road curves by detecting light from roadside reflectors, and directing light into the curve, is not

enabled, because Alden allegedly does not teach how light detected “from roadside reflectors is distinguished from any other detected light.” (POR, 52.)

Once again, Patent Owner provides nothing to support this lack of enablement argument, such as testimony or evidence regarding alleged undue experimentation. (*Id.*) Instead, all Patent Owner does is cite to conclusory testimony from its expert, Dr. Turk, which mirrors the same statements in Patent Owner’s Response and should carry no weight. 37 C.F.R. § 42.65(a). In any event, contrary to Patent Owner’s assertions, Alden explains in sufficient detail how its system identifies upcoming road curvature. It does this by using the same sensors described with respect to Figures 2-4, only this time using them to sense “that the road turns by receiving light from reflectors such as a reflector 157.” (Alden, Figure 11, [0036].)

Alden teaches that its system detects different objects of interest (which would include the roadside reflectors) by checking for light above a certain “threshold” intensity or distance at each location of the sensor array. (*Id.*, Figure 4, [0028]; Papanikolopoulos Decl., ¶134; Papanikolopoulos Depo., 76:16-80:24.)⁷ As explained by Dr. Papanikolopoulos, the logic of Figure 4 would apply to detecting

⁷ Petitioner notes that to distinguish between different objects, such as roadside reflectors or oncoming vehicles, the threshold intensity or distance would simply be adjusted based on the type of object. (Papanikolopoulos Decl., ¶150.)

roadside reflectors, with Paragraph [0036] of Alden now indicating that instead of dimming where objects (*i.e.*, reflectors) indicating the curve are detected, the system will now “direct light into the corner” by switching LEDs directed towards the reflectors to high beam and switching certain LEDs not directed at the curve to low beam or even off. (Papanikolopoulos Decl., ¶¶131-32; Papanikolopoulos Depo., 76:16-80:24.) Thus, as shown in the Petition, Alden would not simply “dim” all lights directed to the road curve in Figure 11 as Patent Owner alleges, but would rather control the LEDs using the process described in Figure 4 to “switch [] segments to high beam” that direct light into the curve. (Petition, 62-65; Alden, Figure 4, [0028], [0036]; Papanikolopoulos Decl., ¶134; Papanikolopoulos Depo., 76:16-80:24.)

Patent Owner is further incorrect that the *additional* information from the steering wheel sensor in Alden does not contribute to identifying an “upcoming” road curvature. (POR, 51-52.) As explained in the petition, turning of the steering wheel by a certain amount indicates the driver will be making a turn corresponding to the amount the wheel was rotated. (Petition, 62-64; Papanikolopoulos Decl., ¶133.)

IX. Dependent Claims 51/59/67/75/83: Alden Discloses Accommodating a Road Curvature by Directing Light into Upcoming Turns

Regarding claims 51/59/67/75/83, in addition to the enablement arguments also directed to claims 50/58/66/74/82 addressed above, Patent Owner argues that Alden does not teach “accommodat[ing] of the road curvature by changing illumination in the at least a direction of the curvature by adaptation of the light pattern in at least one of color, intensity, or spatial distribution.” Patent Owner argues that in all embodiments of Alden, all beam segments are always on high beam unless specifically dimmed, and thus cannot increase in intensity to illuminate a road curve. (POR, 53-57.) This is a misstatement of how Alden’s system functions.

Alden’s system does not default all LEDs to high beam state unless otherwise dimmed “in all embodiments” as Patent Owner argues. Rather, Alden explains its system can be used for “many applications,” and regarding Figure 11 details an additional functionality of the segmented headlight being “used to concentrate light to look around corners” when the vehicle senses road turns, by directing “light into the corner to maximize the driver’s ability to see there.” (Alden, [0036], [0061]; Papanikolopoulos Decl., ¶¶132-33, 135-36; Papanikolopoulos Depo., 50:9-51:3, 73:25-74:24, 78:22-80:24.)

As shown in Figure 4 at element 109, Alden’s system can “switch requisite headlight segments to dim” *and* “switch other segments to high beam.” (Alden, Fig. 4, [0027]-[0029], [0036], [0061].) Thus, in the context of Figure 11 where the system will “concentrate” and “direct” light into a corner, Alden’s system does not by

default have all sectors on high and then dim certain ones. (Alden, [0036], [0061]; Papanikolopoulos Decl., ¶¶132-33; Papanikolopoulos Depo., 50:9-51:3, 73:25-74:24.) Instead, Alden can selectively switch to high beam those LEDs that are positioned on the curve—for example those at one of the extreme ends of the curve in Figure 5—such that they would then direct high beam light into the area of the road curvature to “concentrate” light there. (Alden, [0036], [0061], [0027]-[0029]; Papanikolopoulos Decl., ¶¶132-33.)

This switching on of LEDs directed at the curve to high beam light is at least an adaption of the light pattern in intensity or spatial distribution to accommodate the road curvature. (Papanikolopoulos Decl., ¶134; *see also* Petition, 62-65.)

X. Dependent Claims 53/61/69/77/85: Petitioner Argued, and Alden Discloses, Identifying Road Turns Using the Light Sensors

Claims 53/61/69/77/85 require that the “identification of the upcoming road curvature is based at least in part on the sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data.” Patent Owner argues Petitioner’s anticipation contentions fail because Petitioner allegedly relies on Alden’s vehicle steering wheel rotation sensor to identify the upcoming road curvature and adapt the light pattern in response, whereas Petitioner cited light sensors as “the sensors” in the independent claims. (POR, 60-62.)

This is not true. For claims 53/61/69/77/85, the Petition specifically argues that “Alden’s system can sense when a road curves in front of a vehicle based on *sensor data detecting road reflectors*”—that is, the same light sensors cited for the independent claims that sense incoming light in Alden are the ones used to detect road reflectors to identify a turn. (Petition, 67.) The Petition cites back to claims 50/58/66/74/82 (from which claims 53/61/69/77/85 depend) as providing further detail on how the light sensors in Alden are used to sense incoming light and identify an upcoming turn. (*Id.*)

The Petition merely states Alden’s system can *additionally* include data from a steering wheel sensor.⁸ (*Id.*, 67; Papanikolopoulos Decl., ¶¶133-38.) Even when this additional data is introduced, the identification and adaptation is still *based at least in part* on the light sensor data as the claims require.

XI. The Petition Adequately Explained How Alden in View of Beam

⁸ These steering wheel sensors also provide “coordinate specific information” about the illuminated area as recited in the independent claims, as they provide information regarding the degrees of rotation corresponding to the direction of the vehicle with respect to the illuminated area. (Alden, [0039]-[0040]; Papanikolopoulos Decl., ¶¶133-38.) And as Alden states, this degree of rotation information is used to change the direction of the light output. (*Id.*)

Renders Obvious Claim 51

Patent Owner argues the Petition fails to prove that Alden anticipates dependent claim 51 because Alden does not teach the claim limitation of “the control of the light emitted from the first cluster includes a change of at least one LED of the cluster to a *non-emitting state*.” (POR, 58-59.) However, the Petition is clear that, in incorporating the invalidity grounds of Claim 49 into the invalidity reasoning for Claim 49, Claim 51 was challenged as being invalid over Alden (alone or in combination with Stam (EX1008)) in view of Beam (EX1007).

Specifically, the Petition clearly points out that claim 51 is “substantially identical” to claim 49, except that claim 51 recites one additional limitation. (Petition, 65-67; Papanikolopoulos Decl., ¶¶135-136.) The Petition also explains that the common elements in claim 49 and claim 51, including the “non-emitting state” limitation, are anticipated or rendered obvious for the same reasons. (Petition, 65; Papanikolopoulos Decl., ¶135.) Regarding claim 49, the Petition explains how Alden (alone or in combination with Stam) in view of Beam discloses claim 49, relying on Beam’s teachings regarding a “non-emitting state.” (Petition, 72-81; Papanikolopoulos Decl., ¶¶143-157.) The Petition incorporates these grounds into claim 51, and further explains that the additional limitation in claim 51, *i.e.*, claim 51g is disclosed by Alden. (Petition, 66-67.)

Thus, reading the Petition in context, it is clear the Petition argues claim 51 is rendered obvious by Alden (alone or in combination with Stam) in view of Beam, just like claim 49.

XII. The Petition Establishes the Challenged Claims Are Invalid Over Alden

Patent Owner argues Petitioner failed to sufficiently explain its obviousness contentions based on Alden alone because it does not sufficiently explain how Alden must be modified and why a person having ordinary skill would be motivated to do so. (POR, 63.)

Petitioner met the requirements necessary to demonstrate obviousness based on Alden alone because, to the extent Alden does not explicitly disclose any limitation, it would have been obvious for the same reasons provided in the Petition. Throughout the Petition, Petitioner explains how a person having ordinary skill would have understood the art. (*See, e.g.*, Petition 70, 73, 76, 79, 84.) To the extent the Board is inclined to find the POSITA's understanding extends beyond what is explicitly disclosed by a given reference, the addressed limitation would be obvious for the same reasons.

XIII. Conclusion

For the reasons above and in the Petition, the Board should cancel the challenged claims as unpatentable.

Dated: May 28, 2024

Respectfully submitted,

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Certificate of Word Count

The undersigned certifies, in accordance with 37 C.F.R. § 42.24(d), that the foregoing **PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE** complies with the type-volume limitation of 5,600 words, comprising 5565 words, excluding the parts exempted by § 42.24(c).

Dated: May 28, 2024

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Certificate of Service

The undersigned certifies that, in accordance with 37 C.F.R. § 42.6(e) and 37 C.F.R. § 42.105, the foregoing **PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE** was served on May 28, 2024, electronically via e-mail upon the following parties:

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