

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. 11,208,029 to Spero

Case No: IPR2023-01034

**PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION
FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.107**

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List of Exhibits

Exhibit No.	Description	Identifier
2001	Declaration of Matthew A. Turk, PhD	Turk Decl.
2002	Curriculum Vitae of Matthew A. Turk, PhD	Turk CV
2003	Intentionally left blank	
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	Alden Prosecution History

I. Introduction

Pursuant to 37 C.F.R. § 42.107, Patent Owner, Yechezkal Evan Spero (“Patent Owner”), submits the following Preliminary Response (“Preliminary Response”) to the Petition for *Inter Partes* Review filed by Mercedes-Benz USA, LLC (“Petitioner”) that challenges Claims 1-33 (“Challenged Claims”) of U.S. Patent No. 11,208,029 (“the ’029 Patent”).

Patent Owner respectfully requests that the Patent Trial and Appeal Board (“the Board”) deny the Petition on every ground alleged by the Petitioner.

II. The Petition Fails to Meet the Statutory Threshold for *Inter Partes* Review

The Board may only grant a petition for *inter partes* review where “the information presented in the petition . . . shows that there is 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); 37 C.F.R. § 2.108(c). Petitioner bears the burden of showing that this statutory threshold has been met. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,765 (Aug. 14, 2012) [hereinafter “Practice Guide”] (“The Board . . . may institute a trial where the petitioner establishes that the standards for instituting the requested trial are met . . .”). If *inter partes* review is granted, Petitioner then has the burden of proving unpatentability by a

preponderance of the evidence. 35 U.S.C. § 316(e). As explained below, neither burden is met here.

As to Petitioner's claim of obviousness under 35 U.S.C. § 103, Petitioner must show where each claim limitation is found in the prior art. *See, e.g., Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1361 (Fed. Cir. 2012). Failure to do so defeats a claim of obviousness. (*Id.*) Here, the references relied upon by Petitioner lack material elements of all the independent claims. *See, e.g., Practice Guide*, 77 Fed. Reg. at 48,764. Additionally, Petitioner's minimal discussion of the rationale to combine, including the combination of different embodiments of the primary reference, lacks the requisite specificity to explain why one of ordinary skill would have been motivated to do so and how such a combination would have worked. As a result, Petitioner's obviousness arguments lack sufficient evidence, leaving Petitioner without a reasonable likelihood of prevailing as to any of the Challenged Claims.

Procedurally, the Petition should further be denied under § 314 because Petitioner's coordinated serial petition strategy raises fairness and efficiency concerns. For these reasons, and others explained below, the Board should deny Petitioner's Petition for *inter partes* review.

III. Overview of the '029 Patent

The '029 Patent is directed to “a novel multi-light source approach to the design and construction of solid-state lighting fixtures ... (vs. solid state lamps), which is termed a ‘Digital Lighting Fixture’, due to the control of individual lighting element ‘digits’ to provide the ‘correct’ lighting solution for the situation at hand.” (Ex. 1001, 11:5-13.) The '029 Patent further explains that “[t]he terminology ‘digital’ as used herein refers to the discrete nature of the multiple LED lamps provided in the luminaire, whereby, ‘digital’ control results from the individual control of the discrete, i.e., ‘digital’ lighting elements, the LEDs, in the luminaire.” (*Id.*, 2:67-3:5; Ex. 2001, ¶23.)

The '029 Patent also describes the deficiencies of prior art lighting systems that replace conventional lights with solid-state LED light sources “with some minor adjustments” but do not utilize the full “digital” control of the LEDs. (Ex. 1001, 9:60-63; Ex. 2001, ¶24.)

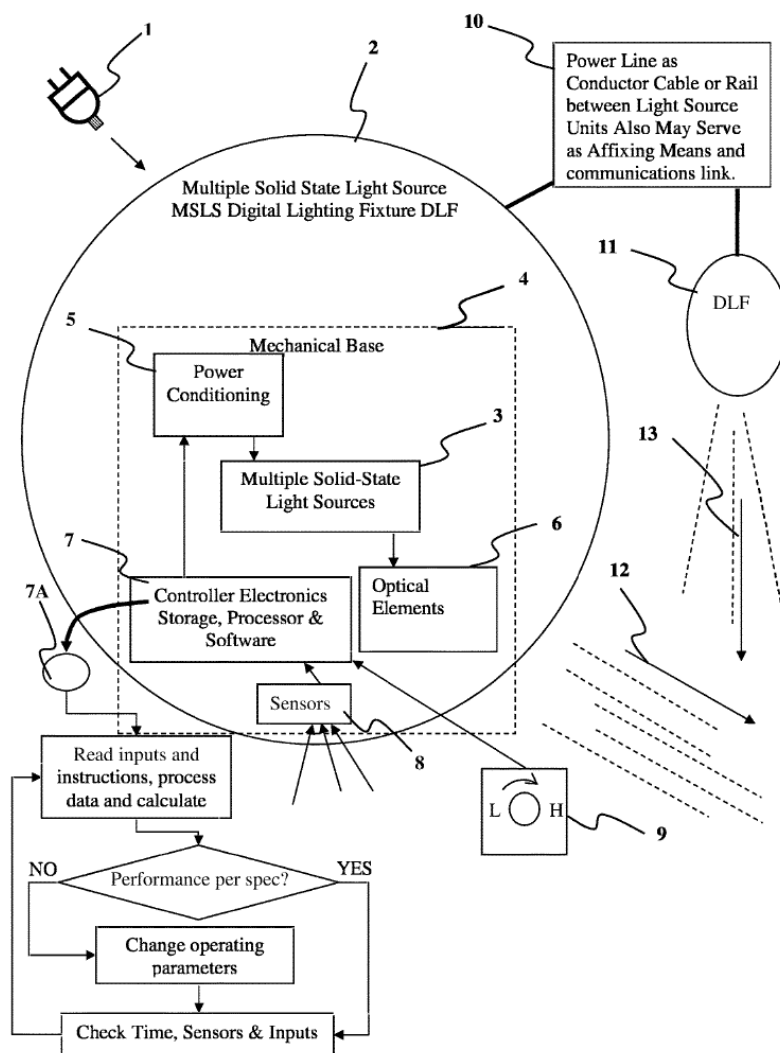


FIG. 1

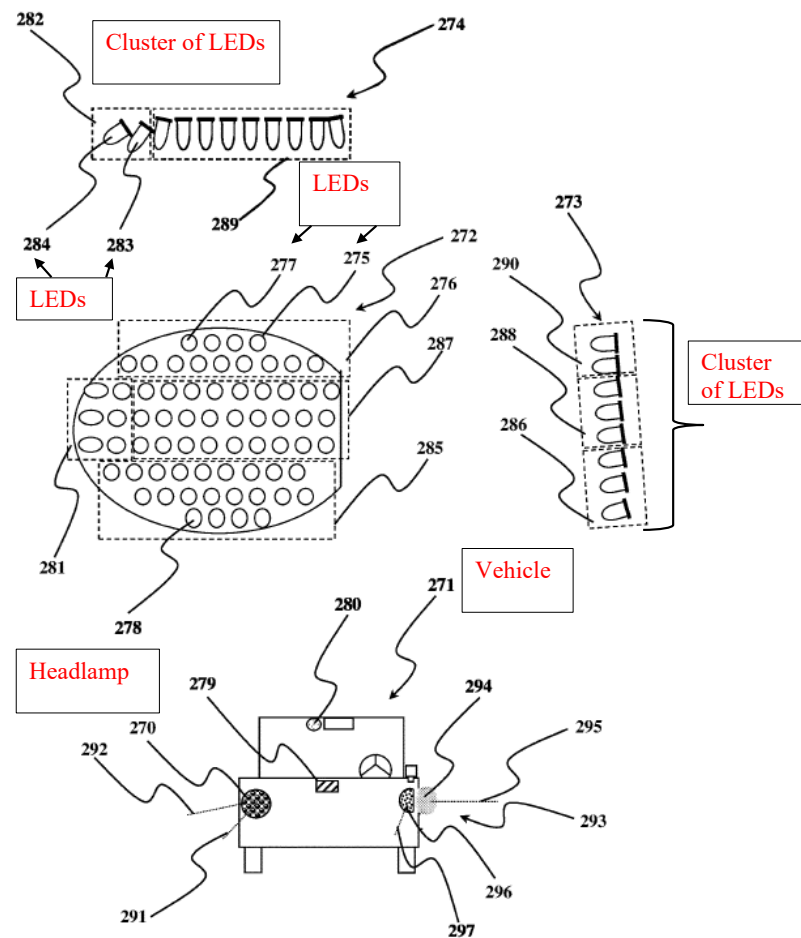
(Ex. 1001, Fig. 1.)

The digital lighting fixture (DLF) “includes more than one light source 3, which is preferably an electroluminescent solid-state light source” (SLS) and power conditioning circuitry 5 to condition the power supplied to the light sources 3. (Ex. 1001, 25:5-17.) For example, the LEDs may be operated on “pulse power and current as well as timing in terms of duty cycle, pulse width and other signal modulations

are useable by the controller to effect intensity changes.” (*Id.*, 23:22-25.) “The direction of light exiting from the DLF as a whole or from each SLS individually is controllable by optical elements 6, such as reflective surfaces and or refractors, and may be electronically variable optical elements.” (*Id.*, 25:17-21; Ex. 2001, ¶25.)

The '029 Patent describes “a different approach which is to provide the end user with the most correct lighting solution not a new technology lamp to replace the old one.” (Ex. 1001, 11:5-8.) “In contrast to a prior art, single large, lamp replacement like light source, the present invention provides multiple, small sized sources of differing characteristics such that the effect of the whole is greater than the sum of the individual parts.” (*Id.*, 11:45-49.) “The added controllability offered by breaking the total light output up into **discrete (‘digital’) specifically aimable and dimmable elements**¹ which can be addressed by control electronics to effect intensity, spectrum and spatial distribution of intensity and spectrum, yields a lighting fixture (vs. lamp) of unparalleled performance.” (*Id.*, 11:56-62.) “The invention embraces LED-illuminating devices covering a wide scope of applications,” including transportation. (*Id.*, 11:14-21, 4:18-20, 50:49-50; Ex. 2001, ¶26.)

¹ Emphasis added by Patent Owner unless indicated otherwise.



(Ex. 1001, FIG. 15, Annotated)

The claimed invention of the '029 Patent, titled “Adaptive Headlight System,” is directed to multi-LED headlight systems that provide predictive curve illumination with the receipt of map data indicating a road curvature upcoming along a road on which the motor vehicle is traveling. The '029 claimed invention solves the problem of how to provide a digital lighting solution that can “provide the optimal lighting solution in real-time” to predictively illuminate an upcoming road curvature. (Ex. 1001, 57:43-49.) The '029 Patent describes using a digital light

fixture (DLF) to provide multiple functions, for example “[i]n a DLF it is possible to combine a task light having a very narrow ‘spot’ beam at the correct aiming with a general area lighting ‘flood’ beam into one fixture.” (*Id.*, 22:26-28.) Similarly, an adaptive headlight system may utilize this dual functionality to aim a light beam at a curve ahead of the vehicle while maintaining forward lighting. (Ex. 1001, 50:61-67; 51:54-67; Ex. 2001, ¶27.)

The Challenged Claims include independent claims 1, 12, and 23. Independent claim 1 is representative and reproduced below with emphasis added. The Predictive Curve Limitations call for the processor to determine **changes** involved with *adapting a light pattern of the headlamps, in at least one of color, intensity or spatial distribution to increase light in the direction of the road curvature* and control the LED light sources *to provide light based at least in part on the determined light change and prior to the motor vehicle reaching the road curvature:*

1. A system for a motor vehicle, comprising:
a plurality of headlamps, each comprising a plurality of
LED light sources;
one or more processors; and
a memory storing instructions that, when executed by one or more of
the one or more processors, enable the one or more processors to:

receive first data, including at least map data, indicating a road curvature upcoming along a road on which the motor vehicle is traveling;

determine a light change, the change adapting a light pattern of the headlamps in at least one of color, intensity or spatial distribution **to increase light in a direction of the road curvature ahead of the motor vehicle and shaping light based at least in part on the road curvature**; and

Predictive
Illumination
Determination
Limitation

control at least a first plurality of the LED light sources to provide light **based at least in part on the determined light change and prior to the motor vehicle reaching the road curvature.**

Control
Limitation

(Ex. 1001, claim 1.)

The '029 Patent describes various techniques for predicting and illuminating an upcoming curve in the road. For example, Adaptive Frontal-lighting Systems are provided that “aid in seeing around curves and other features in the road.” (*Id.* 51:54-

56.) These systems predict upcoming curves in the road based on “instantaneous road conditions” and map data. (*Id.*, 51:56-67.) “A GPS system on the car may also let the headlamps system know of curves up ahead, one-way traffic and others factors such [that] the headlamp may be operated in the optimal mode at that instantaneous location.” (*Id.*) The ’029 Patent also describes adjusting “the intensity, spectrum and beam pattern of the headlamp” based on “instantaneous road conditions” and map data indicative of an upcoming curve. (*Id.*; Ex. 2001, ¶29.)

IV. Level of Ordinary Skill

Patent Owner does not dispute Petitioner’s proposed skill level for a person of ordinary skill in the art (“POSA”). (Petition at 8-9.)

V. Claim Construction

No claim construction is necessary to deny institution because Patent Owner’s arguments for denial do not hinge on the outcome of an actual controversy about claim interpretation. *See Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[C]laim terms need only be construed to the extent necessary to resolve the controversy”). The deficiencies of the Petition are readily identifiable without defining the bounds of any specific claim term or phrase. *Id.*

VI. The Applied References

A. Alden

Alden is directed to controlling the distribution of light by a vehicle headlight.

Alden's systems include headlights that produce multiple individually controllable beam segments of light, each illuminating a sector of the area ("distribution area") ahead of the vehicle equipped therewith ("equipped vehicle"). (Ex. 1005, ¶¶[0002, 0004-0006, 0008]; Ex. 2001, ¶33.)

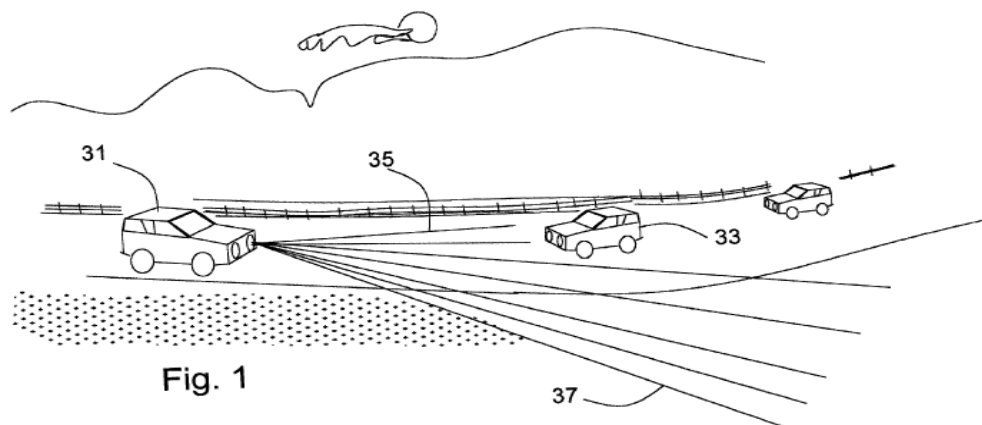


Fig. 1

(Ex. 1005, FIGURE 1)

The systems also include sensors 51a, 51b for detecting incoming light received from the distribution area, which sensors 51a, 51b are divided into multiple sectors associated with sectors of the distribution area illuminated by the beam segments of the headlight of the equipped vehicle. (Ex. 1005, ¶¶[0027-0028], Fig. 4.; Ex. 2001, ¶34.) The systems further include a central processing unit (CPU) 71 that determines whether incoming light detected in each sector of the sensors 51a, 51b has an intensity that meets a threshold value. (Ex. 1005, ¶¶[0027-0028], Fig. 3; Ex. 2001, ¶34.)

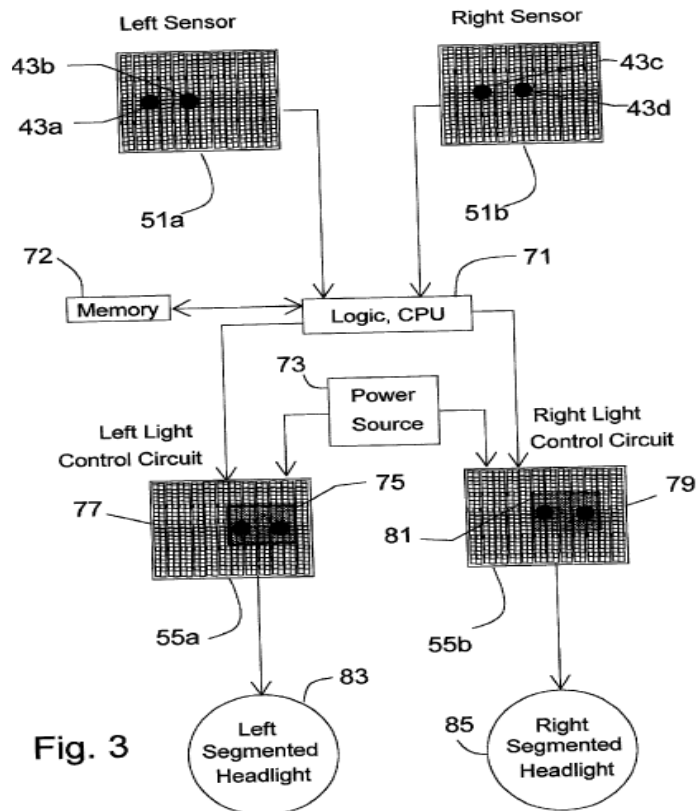
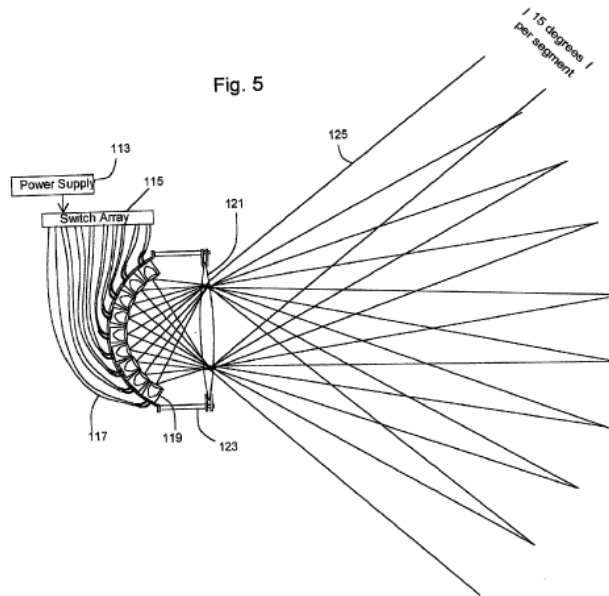


Fig. 3

(Ex. 1005, FIGURE 3)

In one of the two types of embodiments described, illustrated in Figures 1, 2, and 5-7, the headlight system dims the intensity of those beam segments produced by the headlight of an equipped vehicle that are incident on a sector or sectors in the distribution area. (Ex. 1005, ¶¶[0025, 0026, 0029]; Ex. 2001, ¶35.) In one example of this type of embodiment, shown in Figure 5, a headlight 123 employs a one-dimensional array of light emitting diode (LED) elements 119 and a convex lens 121 for directing the beam segment produced by each LED element 119 that illuminate different sectors of the distribution area. (Ex. 1005, ¶¶[0025, 0026, 0029]; Ex. 2001, ¶35.) In another example of this type of embodiment, shown in Figures 6 and 7,

electro-optical dimming means are employed. (Ex. 1005, ¶¶[0025, 0026, 0029]; Ex. 2001, ¶35.)

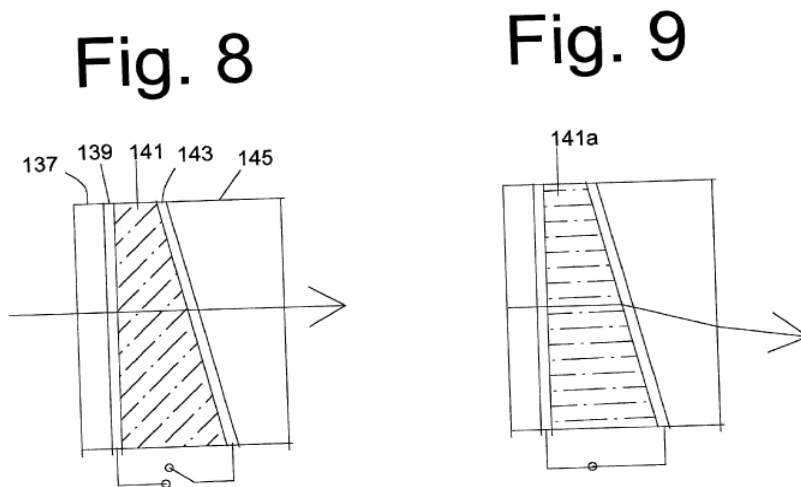


(Ex. 1005, FIGURE 5)

The CPU 71 determines the sector or sectors of the sensors 51a, 51b receiving incoming light from the distribution area that have a detected threshold intensity. In response, the CPU 71 controls the headlight 123 to dim those beam segments or segments produced by the individual LED elements 119 that illuminate the distribution area sector or sectors associated with any such sensor sectors. (Ex. 1005, ¶¶0026-0029; Ex. 2001, ¶36.)

In the other of the two types of embodiments described, illustrated in Figures 8-15, the headlight system changes the direction of light produced by the headlights of an equipped vehicle. (Ex. 1005, ¶¶10032-0040]; Ex. 2001, ¶37.) For example,

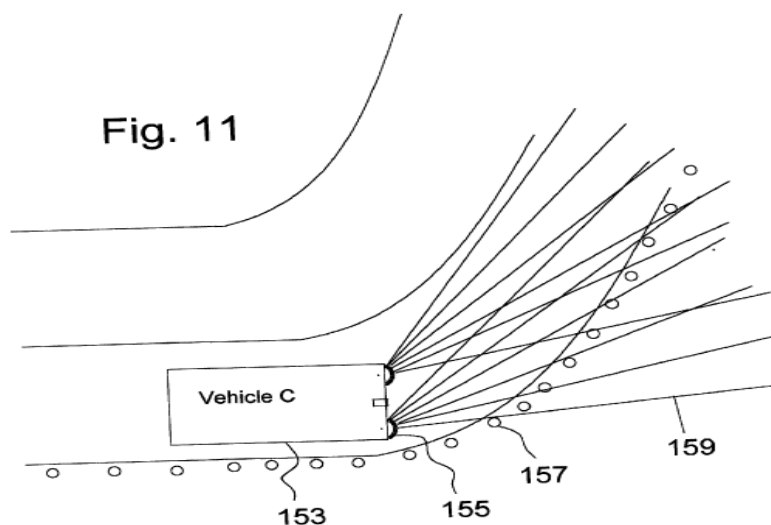
light produced by the equipped vehicle headlights may be re-directed from a forward direction to a leftward or rightward direction to illuminate a turn in the road, or from a forward direction to an upward or downward direction to illuminate an incline or decline in the road. In these embodiments, the headlight system employs a single point light source 129, a collimating reflector 131, electro-optical refractive elements 127, and a concave lens 133 to produce multiple light beam segments. (Ex. 1005, ¶¶[0032-0040]; Ex. 2001, ¶37.)



(Ex. 1005, FIGURES 8, 9)

In one example of this second type of embodiment, the CPU 71 determines the sector or sectors of the sensors 51a, 51b receiving incoming light from the distribution area that have a detected threshold intensity. (Ex. 1005, ¶[0036], Figure 11; Ex. 2001, ¶38.) In response, the CPU 71 controls the electro-optical refractive elements 127 of the headlight to change the direction of the beam segments produced thereby to illuminate a turn in the road. (Ex. 1005, ¶[0036], Figure 11; Ex. 2001,

¶38.)



(Ex. 1005, FIGURE 11)

Significantly, each of the two types of embodiments disclosed by Alden is distinct and includes features that are incompatible with the other type of embodiment. (Ex. 2001, ¶39.) For example, the headlight system embodiment described in connection with Figures 8-15 having electro-optical refractive elements 127 for changing the direction of headlight beam segments is designed to work with collimated light produced by single point light source 129, collimating reflector 131, and concave lens 133. (Ex. 1005, ¶¶[0036-0038]; Ex. 2001, ¶39.) However, the LED elements 119 of the headlight system embodiment described in connection with Figure 5 produce non-collimated light. (*Id.*) Non-collimated light cannot be directed in any meaningful fashion by the electro-optical refractive elements 127 of the headlight system embodiment described in connection with Figures 8-15. (*Id.*)

Rather, non-collimated light would blend and have different incident angles on those electro-optical refractive elements 127 thereby preventing any meaningful control of individual sectors as well as redirecting much of the non-collimated light they receive away from the desired segments of the distribution area. (*Id.*) Any combination of these different types of Alden's headlight system embodiments would therefore be incapable of meeting the basic requirements of a headlight, *i.e.*, effectively illuminating the area ahead of the equipped vehicle, let alone directing its emitted light in any meaningful fashion. (*Id.*) Indeed, rather than suggesting combinations of various features of its different headlight system embodiments, Alden only states generally that each of its two types of headlight system embodiments may employ the sensing elements 51a, 51b discussed in connection with Figures 3 and 4. (*Id.*)

Additionally, Alden is a theoretical reference that fails to enable much of its disclosure and is ambiguous in critical respects. (Ex. 1005, ¶[0027]; Ex. 2001, ¶40.)² In that regard, the disclosure in Alden is directed to certain features of headlamp

²Notably, Alden contacted Gentex Corporation, an automotive industry supplier, regarding his segmented headlight system and was informed that Gentex's technical staff had determined the system to be "futuristic" and likely "years away from any practical use." (Ex. 2006 at 39; Ex. 2001, ¶41.)

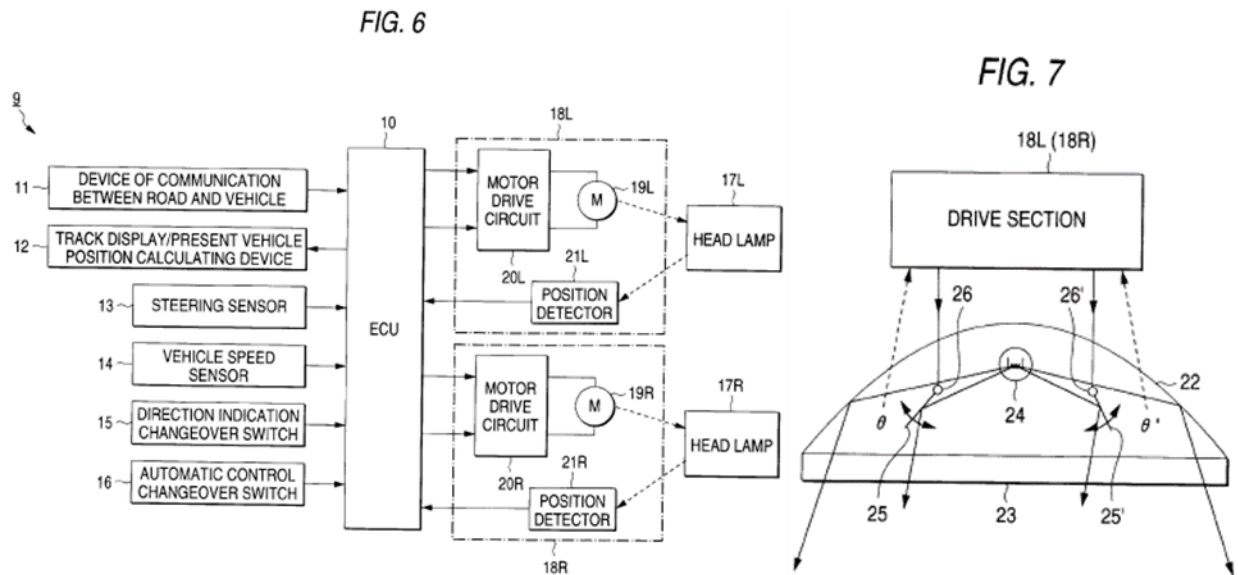
systems and general benefits such features and systems could provide but lacks detailed explanations as to how those features and systems are practically implemented or how those benefits are realized thereby. (*Id.*) For example, while Alden depicts control circuit switch array switches in Figure 3 for dimming certain headlight beam segments while leaving other beam segments on high intensity, it does not clearly describe or specifically demonstrate how such operations are accomplished using the one-dimensional array of LED elements 119 of headlight 123 illustrated in Figure 5. (*Id.*) In connection with Figure 4 Alden describes progressing through the sectors of sensors 51a, 51b of Figure 3 to detect incoming light, but it does not explain how those sensor sectors are mapped to either the one-dimensional array of LED elements 119 shown in Figure 5, the switches 115 for that array, or the distribution area sectors depicted therein. (*Id.*) In fact, Alden specifically states that the switch arrays of the light control circuits 55a, 55b shown in Figure 3 are merely for illustrative purposes. (*Id.*)

B. Kobayashi

Kobayashi is directed to a mechanical headlight control system that changes direction or range of a non-LED headlight beam using map information unless a predicted vehicle travel direction as indicated by a turn indicator, steering angle, vehicle speed/acceleration differs from the map data, i.e., “[w]hen the vehicle advancing direction at which the driver aims does not coincide with the profile of

the road.” (Ex. 1006, 2:34-36.) More specifically, Kobayashi discloses a headlamp system with moveable components to control irradiation (illumination) direction and range in accordance with a road profile when the vehicle travels along a scheduled course, or in accordance with a steering angle and vehicle speed when the predicted advancing direction of the vehicle deviates from the scheduled course. (Ex. 1006, 6:4-10, 17:59-67; Ex. 2001, ¶42.)

Kobayashi changes irradiation direction using a motor to either rotate the entire lighting device about its axis, or to change relative position among internal lighting device components, such as a reflecting mirror, lens, light source, or shielding member. (Ex. 1006, 6:11-39.) Irradiation range is controlled by either combining different lighting devices with each other (such as a fog lamp, head lamp, and cornering lamp), or by controlling a motor to change position of the internal components (such as reflecting mirrors lenses, or shades) relative to one another. (Ex. 1006, 6:40-7:14.) Irradiation range may be changed responsive to a branch (intersection) ahead on a road by moving the internal lighting device components to change a horizontal irradiating angle α . (Ex. 1006, 8:1-32; Ex. 2001, ¶43.)



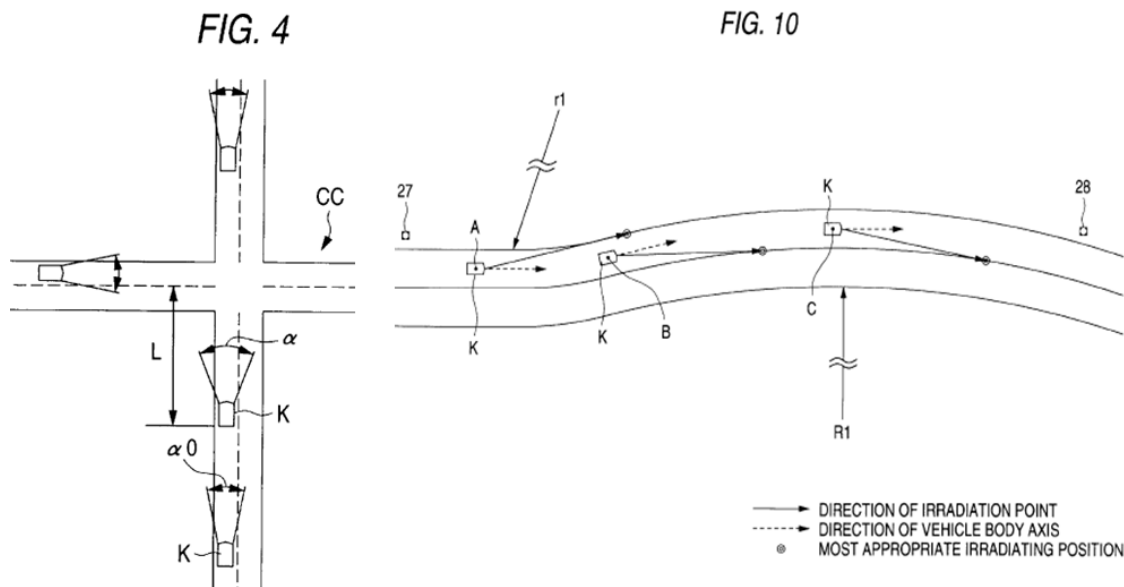
(Ex. 1006, FIGs. 6, 7)

Kobayashi's ECU 10 receives signals from communication device 11 (conducting communication between a road and vehicle), track display/present vehicle position calculating device 12, steering sensor 13, vehicle speed sensor 14, direction indicating switch 15, and automatic control change-over switch 16. ECU 10 generates signals for drive sections 18L, 18R of head lamps 17L, 17R arranged on the left and right front portion of a vehicle. (Ex. 1006, 10:1-17.) Drive sections 18L, 18R include associated motor drive circuits 20L, 20R to drive associated motors 19L, 19R with position detectors 21L, 21R to detect the posture of the head lamps 17L, 17R or their composing members (internal components). (Ex. 1006, 10:66-11:4; Ex. 2001, ¶44.)

Figure 7 illustrates a headlamp with moveable composing members to control the direction and range of irradiation. Light source 24 and movable reflecting mirrors

25, 25' are positioned between stationary reflecting mirror 22 and front lens 23. Movable reflecting mirrors 25, 25' are rotated about respective rotating axes 26, 26' by a link mechanism to a rotation angle (θ , θ') to provide partial direction control of irradiating light. (Ex. 1006, 11:5-14; Ex. 2001, ¶45.)

Figures 4 and 10 illustrate operation of the moveable composing members of the headlamps to control irradiation range and direction while approaching an intersection and running on a curved road, respectively. (Ex. 1006, 2:48-49, 2:65-67; Ex. 2001, ¶46.)



(Ex. 1006, FIGs. 4, 10)

As shown in Figure 4, Kobayashi's headlamp motors are operated to increase horizontal irradiating angle α to $\alpha > \alpha_0$ based on a distance L from intersection CC and vehicle speed. (Ex. 1006, 8:14-25; Ex. 2001, ¶47.) In Figure 10, the headlamp motors are operated according to road profile information and vehicle speed to

change the irradiating direction toward a determined irradiating position for the driver's line of sight at each position of the vehicle. (Ex. 1006, 14:53-15:28; Ex. 2001, ¶47.) When the vehicle turns to the left at point A, the left shoulder is irradiated. When the vehicle turns to right, the right shoulder is irradiated, etc. (Ex. 1006, 8:14-25; Ex. 2001 ¶47.) If the driver operates the steering wheel by an angle larger than necessary for the curve, irradiation control is conducted in accordance with the vehicle advancing direction predicted by the steering angle. (Ex. 1006, 14:53-15:39; Ex. 2001, ¶47.)

C. Beam

Beam discloses “Adaptive/Anti-Blinding Headlights” (AABH) and is directed to a system that provides a multiplicity of microbeams that “operate at maximum intensity at all times” allowing “the driver to have the equivalent of high beam headlights or brighter on at all times, greatly enhancing the ability to see at night.” (Ex. 1007, 3:8-15, 6:11-12, 6:40-44, 6:54-56; Ex. 2001, ¶81.) Beam provides significantly **reduced** illumination only in those portions of the headlight beam that would otherwise dazzle or annoy other drivers. (Ex. 1007, 3:8-15, 6:40-44.) This is accomplished by “darken[ing] those microbeams that would otherwise illuminate areas near to the source of the impinging beam, thus eliminating the blinding of a driver in an oncoming vehicle, while continuing to provide intense forward illumination.” (Ex. 1007, 1:14-19, Claims 4, 5, emphasis added.).)

VII. The Board Should Deny Institution Because No Ground Has a Reasonable Likelihood of Success

As previously noted, the Petition challenges claims 1-33 (“Challenged Claims”) of the ’029 Patent. (Petition at 5.) Claims 1, 12, and 23 are the only independent claims among the Challenged Claims. (Ex. 1001, 95:55-100:66.) All other Challenged Claims depend directly or indirectly from one of those independent claims. (*Id.*)

For **Ground 1**, Petitioner attempts to combine Alden and Kobayashi to satisfy the elements of claims 1-8-10-19, 21-30, 32, and 33. For **Ground 2**, Petitioner attempts combine Alden, Kobayashi, and Beam to satisfy the elements of dependent claims 9, 20, and 31. (Petition at 5.)

Petitioner has failed to meet the requisite burden of showing a reasonable likelihood that it would prevail on either of these Grounds for at least the reasons that: (i) Petitioner relies on Alden and Kobayashi to allegedly satisfy claim elements that both references fail to teach, and (ii) Petitioner’s rationale for combining Alden and Kobayashi renders the primary reference Alden inoperative or unsatisfactory for its intended purpose.

A. Ground 1: Petitioner’s Combination of Alden and Kobayashi Fails to Teach All of the Limitations of Independent Claims 1, 12, and 23

Petitioner must show where each claim limitation is found in the applied

references. *See, e.g., Kinetic Concepts, Inc. v. Smith & Nephew, Inc.*, 688 F.3d 1342, 1361 (Fed. Cir. 2012). Failure to do so defeats a claim of obviousness. *Id.* To establish a *prima facie* obviousness rejection, all of the claimed elements must be taught or suggested by the prior art. *See In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

1. Petitioner’s Combination of Alden and Kobayashi Fails to Teach the Independent Claim 1 Predictive Illumination Determination and Control Limitations

Petitioner must explain how and why a POSA would have modified or combined the prior art. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (requiring articulated reasoning with rationale underpinning as to why a person of ordinary skill in the art would have combined or modified the teachings of the prior art in the fashion claimed by the patent); *Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017) (holding obviousness determination to be improper where the record lacked a “clear, evidence-supported account” of “how the combination” would work); *Adidas AG v. Nike, Inc.*, IPR2016-00922, Paper 21 at 36 (PTAB October 19, 2017) (holding that challenged claims are patentable when the “Petitioner fails to explain why and how a person of ordinary skill in the art would combine” two references).

“[T]here must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR Int’l Co.*, 550 U.S. at 418, 82

USPQ2d at 1396 (*quoting In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)). As the Federal Circuit recently stated, a prior art combination must be a “suitable option” to satisfy the motivation to combine requirement. *Intel Corp. v. PACT XPP Schwiez AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2023). If a proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125 (Fed. Cir. 1984). Moreover, if a proposed modification or combination of prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are insufficient to render a claim obvious. *In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349, 352 (CCPA 1959). Petitioner completely fails to address these issues.

Independent claim 1 includes the Predictive Illumination Determination Limitation recited as “determine a light change, the change adapting a light pattern of the headlamps in at least one of color, intensity or spatial distribution to **increase light in a direction of the road curvature ahead of the motor vehicle and shaping light based at least in part on the road curvature.**” (Ex. 1001, Claim 1.) Independent claim 1 also includes control elements recited as “**control** at least a first plurality of the LED light sources to provide light based at least in part on the determined light change and **prior to the motor vehicle reaching the road**

curvature.” (*Id.*; Ex. 2001, ¶50.)

Petitioner’s obviousness contentions rely in part on a combination of the headlight system embodiment discussed in connection with Figure 5 of Alden with that of the headlight system embodiment discussed in connection with Figures 8-15 of Alden. (Petition at 25-27.) In that regard, Petitioner cites the headlight system embodiment of Figures 8-15 to allegedly satisfy the Predictive Illumination Determination Limitation of independent claim 1: “determine a light change, the change adapting a light pattern of the headlamps . . . to increase light in a direction of the road curvature ahead of the motor vehicle.” (*Id.*) At the same time, Petitioner cites the headlight system embodiment of Figure 5 to allegedly satisfy the independent claim 1 Control Limitation which recites: “control at least a first plurality of the LED light sources to provide light based on the determined light change.” (*Id.*, at 28-29; Ex. 2001, ¶51.)³

However, each of the embodiments disclosed by Alden is distinct and includes

³Petitioner does not cite Kobayashi in connection with the independent claim 1 elements relating to increasing light or LED light sources, instead relying solely on Alden in connection with these claim elements. Petitioner cites Kobayashi only in connection with the independent claim 1 elements relating to shaping light. (Petition at 25-28; Ex. 2001, ¶51.)

features that are incompatible with the other embodiment. The headlight system embodiment discussed in Alden in connection with Figure 5 is directed to a headlight having a one-dimensional array of individually controlled LED elements 119 and a convex lens 121 for providing selective dimming and a fixed direction (*i.e.*, forward) of non-collimated light produced by the LED elements 119. (Ex. 1005, ¶¶[0025-0026, 0029, Figure 5]; Ex. 2001, ¶52.) In contrast, the headlight system embodiment discussed in Alden in connection with Figures 8-15 is directed to a headlight having a single point light source 129, a collimating reflector 131, electro-optical refractive elements 127, and a concave lens 133 for changing the direction (*i.e.*, forward, left, right, up, down) of multiple beams of columnated light produced by the single point light source 129 and collimating reflector 131. (Ex. 1005, ¶¶[0032-0040]; Ex. 2001, ¶52.)

Alden's non-collimated light producing LED elements 119 and convex lens 121 are incompatible with Alden's electro-optical refractive elements 127 and concave lens 133, which are designed to work with collimated light and, indeed, are inoperable with non-collimated light. (Ex. 2001, ¶53.) Non-collimated light cannot be directed in any meaningful fashion by the electro-optical refractive elements 127 of the headlight system embodiment described in connection with Figures 8-15 of Alden. (*Id.*) Rather, non-collimated light would blend and have different incident angles on those electro-optical refractive elements 127 thereby preventing any

meaningful control of individual sectors as well as redirecting much of the non-collimated light they receive away from the desired segments of the distribution area. (*Id.*) The result of any combination thereof would therefore be incapable of meeting the basic requirements of a headlight, *i.e.*, effectively illuminating the area ahead of the equipped vehicle, let alone directing its emitted light in any meaningful fashion. (*Id.*)

Petitioner cannot simply treat the various features of Alden's embodiments as interchangeable. Instead, Alden's disclosure must support any contention of interchangeability. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008); *Microsoft Corp. v. Biscotti, Inc.*, 878 F.3d 1052, 1068-1069 (Fed. Cir. 2017); *see also, Facebook, Inc. et al v. Uniloc USA, Inc. et al*, IPR2017-01524, Paper 7 at 19-20 (PTAB December 4, 2017) (denying institution stating that Petitioner "inconsistently maps the recited [claim element] to different elements of [the prior art] within its proffered analysis of [the claims]" and *Abiomed, Inc. v. Maquet Cardiovascular, LLC*, IPR2017-01204, -01205, Paper 8 at 11 (PTAB October 23, 2017) (The Board was "unpersuaded that the features of Aboul-Hosn's various embodiments are interchangeable or that one skilled in the art would have combined those features in the manner proposed by Petitioner.")). Extrinsic evidence, such as an expert declaration, on what Alden's different embodiments could include or would accommodate are not the same as what Alden specifically discloses. *Scripps*

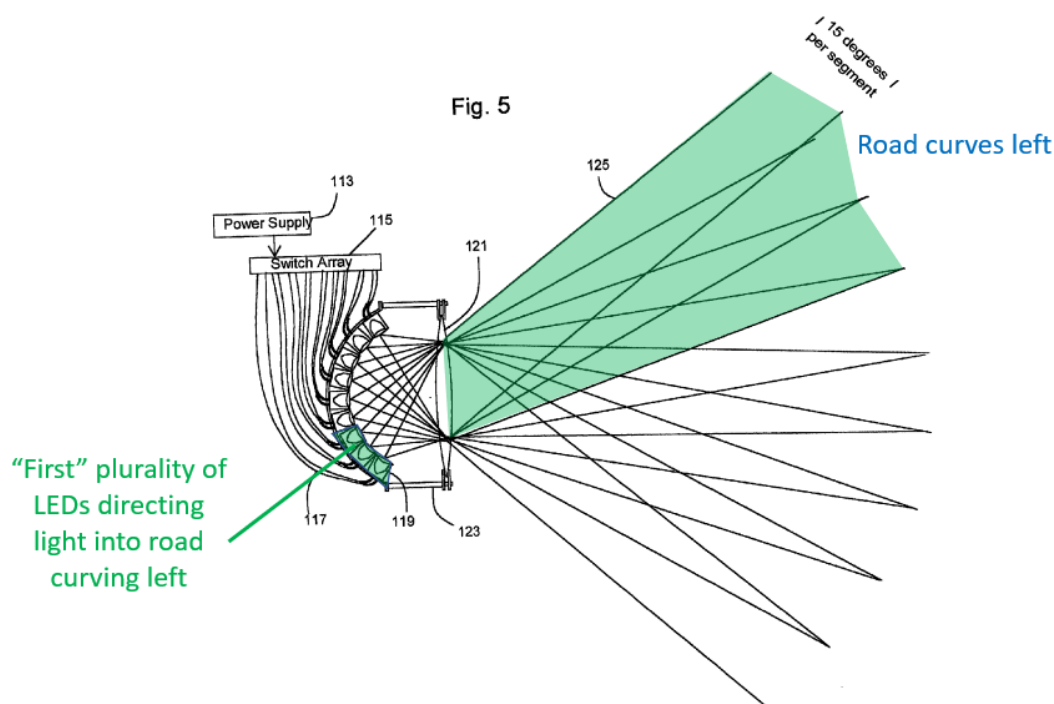
Clinic & Research Found. v. Genentech, Inc., 927 F.2d 1565, 1576 (Fed. Cir. 1991) (overruled on other grounds by *Abbott Labs v. Sandoz, Inc.*, 566 F.3d 1282 (Fed. Cir. 2009)).

Petitioner must provide a sufficient rationale to combine Alden's different embodiments. In that regard, rather than suggesting combinations of various features of its different headlight system embodiments, Alden does nothing more than state generally that each of its two different types of headlight system embodiments may employ the sensing elements discussed in connection with Figures 3 and 4. (Ex. 1005, ¶¶[0036-0038]; Ex. 2001, ¶55.)

Having failed to explain *why* a POSA would have found it obvious to combine those embodiments, any contentions by Petitioner of obviousness based thereon fail. *KSR*, 550 U.S. at 418. Moreover, as the features of Alden's different headlight embodiments are incompatible, Petitioner's combination of Alden's embodiments renders the resulting headlight system inoperable or unsatisfactory for its intended purpose and changes its principle of operation—making it an unsuitable option. As a result, one of ordinary skill would not be motivated to combine Alden and Kobayashi as Petitioner contends and, indeed, the teachings of Alden and Kobayashi are insufficient to render the claimed invention obvious. *Intel Corp. v. PACT*, 61 F.4th at 1381; *In re Gordon*, 733 F.2d at 902; *In re Ratti*, 270 F.2d at 813.

Additionally, to support its contention that Alden allegedly teaches the

Control Limitation of independent claim 1: “control at least a first plurality of the LED light sources to provide light based on the determined light change [to increase light in a direction of the road curvature ahead of the motor vehicle],” Petitioner cites its annotated version of Figure 5 of Alden. (Petition at 29; Ex. 2001, ¶57.) Petitioner’s annotated version of Figure 5 is reproduced immediately below:



(Ex. 1005, FIGURE 5, Annotated by Petitioner)

Unlike elsewhere in its Petition, Petitioner did not annotate Figure 5 to simply highlight elements of Alden’s headlight system. Instead, with these annotations of Figure 5, Petitioner purports to show how headlight 123 operates in a specific scenario. (Ex. 2001, ¶58.) However, the operation of headlight 123 purportedly shown by Petitioner’s annotations of Figure 5 **is not disclosed** in Alden. (Ex. 2001,

¶58.) Petitioner's annotations are therefore mere speculation, *i.e.*, extrinsic evidence that cannot be used to fill gaps in Alden. *Scripps Clinic*, 927 F.2d at 1576 (*overruled on other grounds by Abbott Labs*, 566 F.3d at 1293).

More specifically, Petitioner has annotated Figure 5 of Alden to show a scenario where only a select “first plurality” of LED elements 119 are activated and configured to illuminate sectors on the left of the distribution area ahead of the equipped vehicle, while showing as deactivated the remaining LED elements 119 configured to illuminate sectors in the center and on the right of that distribution area. (Petition at 28-29.) Petitioner's annotation of Figure 5 is inaccurate and misleading.

Contrary to Petitioner's annotations, Alden lacks any mention of *deactivating* selected LED elements 119 of headlight 123. (Ex. 2001, ¶60.) As previously discussed, in the headlight system embodiment of Figure 5, headlight 123 includes LED elements 119 that are individually controlled to provide selective dimming. (Ex. 1005, ¶¶[0025-0026, 0029]; Ex. 2001, ¶60.) That is, all the LED elements 119 are activated and initially emit high intensity beam segments (*i.e.*, high beam) to illuminate a distribution area ahead of the equipped vehicle, and then the high intensity of selected LED elements 119 is reduced so that those selected LED elements 119 subsequently emit low intensity beam segments (*e.g.*, low beam). Thus, none of the LED elements 119 are ever deactivated. (Ex. 1005, ¶¶[0025-0026,

0029]; Ex. 2001, ¶60.)

Moreover, even assuming *arguendo*, that Petitioner's annotation of Figure 5 is accurate (which Patent Owner does not concede), that annotation fails to demonstrate **increasing light** in a direction of a road curvature. Once again, as previously demonstrated, all the LED elements 119 of headlight 123 are activated and initially emit high intensity beam segments (*i.e.*, high beam). (Ex. 2001, ¶61.) Therefore, Petitioner's annotation showing as deactivated those LED elements 119 that illuminate the center and right distribution area sectors ahead of the equipped vehicle while showing as activated only those LED elements 119 that illuminate the left distribution area sectors ahead of the vehicle does nothing to **increase** the light from LED elements 119 illuminating those left distribution area sectors. This is true even if all the LED elements 119 of headlight 123 are activated (*i.e.*, none are selectively deactivated), because the intensity of the light emitted by those LED elements 119 illuminating the left distribution area sectors (indeed, the intensity of the light emitted by any LED element 119 illuminating any sector of the distribution area) is **never increased** beyond the (high) intensity emitted when they are initially

activated.⁴ (Ex. 2001, ¶61.)

It is only by mischaracterizing the operation of the headlight system embodiment of Figure 5 of Alden that Petitioner can pretend that headlight system embodiment “teaches” the Predictive Illumination Determination Limitation of independent claim 1: “determine a light change . . . to increase light in a direction of the road curvature ahead of the motor vehicle.” Because Alden does not teach this limitation, Petitioner’s obviousness contention fails. *See, e.g., Kinetic Concepts*, 688 F.3d at 1361.⁵

Still further, contrary to Petitioner’s contentions, neither Alden nor Kobayashi teaches the independent claim 1 elements directed to shaping light. As previously demonstrated, the headlight system embodiment discussed in connection with Figure 5 only dims selected LED elements 119 of headlight 123; it does not even

⁴Furthermore, as also previously demonstrated, the light produced by headlight 123 of the headlight system embodiment of Figure 5 of Alden has a fixed, forward direction toward the distribution area ahead of the equipped vehicle, which direction is never changed. (Ex. 1005, ¶¶[0025-0026, 0029]; Ex. 2001, ¶61.)

⁵Once again, Petitioner does not cite Kobayashi in connection with the independent claim 1 elements relating to increasing light, instead relying solely on Alden in connection with those claim elements. (Petition at 25-28.)

change the direction of the beam segments emitted by the LED elements 119, let alone **shape** those beam segments. (Ex. 2001, ¶63.) As also previously demonstrated, the headlight system embodiment of Figures 8-15 merely changes the direction of light emitted by the headlight having a single point light source 129 and collimating reflector 131 from a forward direction to a left, right, up, or down direction, but does not shape the light emitted. (Ex. 1005, ¶¶0029-0040]; Ex. 2001, ¶63.)

Thus, in each of the two types of headlight system embodiments of Alden, the overall **shape** of the light emitted by the headlight remains unchanged before, during, and after dimming (according to the embodiment of Figures 1, 2, and 5-7 of Alden) or re-direction (according to the embodiment of Figures 8-15 of Alden). The concept of **shaping** light emitted by its headlight system embodiments is **never discussed** in Alden and, indeed, the words “shape,” “shaped,” or “shaping” never appear in Alden’s disclosure. (Ex. 2001, ¶64.) To “remedy” this obvious deficiency in Alden, Petitioner simply equates Alden’s discussions relating to “directing” and “concentrate[ing]” light with shaping light -- offering only its expert’s declaration in support (Petition at 26-27), which is insufficient. *Scripps Clinic*, 927 F.2d at 1576 (*overruled on other grounds by Abbott Labs.*, 566 F.3d at 1293).

Petitioner does the same regarding Kobayashi. (Petition at 27.) However, in the context of road curves, Kobayashi discloses only changing the direction of light

produced by vehicle headlights, and never discloses shaping light. In that regard, Kobayashi's disclosure of controlling the (lateral) range of light emitted by vehicle headlights relates only to road intersections (also referred to as branches), which Kobayashi explicitly distinguishes from road curves. (Ex. 1006, 14:53-16:56, Figure 11; Ex. 2001, ¶65.)

It is only by *conflating* the concept of *directing* light with that of *shaping* light that Petitioner can allege that Alden and/or Kobayashi disclose(s) the Predictive Illumination Determination of independent claim 1 -- "determining a light change, the change . . . **shaping light based at least in part on the road curvature.**" (Petition at 25-27; Ex. 2001, ¶66.) Because neither Alden nor Kobayashi teaches the Predictive Illumination Determination, any combination of those references would fail to result in the claimed invention recited therein. Petitioner's obviousness contentions therefore fail. *See, e.g., Kinetic Concepts*, 688 F.3d at 1361; *see also, e.g., In re Royka*, 490 F.2d 981.

Also contrary to Petitioner's contentions, neither Alden nor Kobayashi teaches the Control Limitation of independent claim 1 directed to a processor to control a first plurality of LED light sources to provide light based on a determined light change **prior to** the equipped vehicle reaching a road curvature. (Ex. 2001, ¶67.) Petitioner contends that Alden teaches the Control Limitation because it allegedly discusses the detection of an upcoming road turn in connection with the

headlight system embodiment of Figure 11 thereof. (Petition at 29-30.)⁶ Even assuming *arguendo*, that Alden discusses detection of an upcoming curve (which Patent Owner does not concede), the mere detection of an upcoming curve is obviously neither the same as nor a teaching of re-directing the light produced by the headlight of that embodiment, let alone re-directing that light ***prior to*** the equipped vehicle entering that turn. Indeed, Alden does not discuss the timing of the re-direction of the light emitted by headlights 155 in connection with Figure 11. (Ex. 1005, ¶[0036]; Ex. 2001, ¶67.) Rather, the only discussion of the timing of the re-direction of light occurs in connection with Figures 14 and 15, where Alden states “[a]s the steering wheel 191 rotates “x” degrees, rotation sensor 193 detects the rotation” and “[t]he system calculates the new direction of the vehicle and changes the direction of the headlight output 197 a corresponding “f(x)” degrees.” (Ex. 1005,

⁶In that regard, in connection with Figure 11, Alden merely states that “an equipped vehicle 153 senses that the road turns by receiving light from reflectors, such as reflector 157” and does not teach that such sensing occurs ***prior to*** the equipped vehicle entering the turn. (Ex. 1005, ¶[0036]; Ex. 2001, ¶67.) Similarly, Alden’s statement that “[t]he responding headlights 155 direct light into the corner to maximize the driver’s ability to see there” also is not a teaching that such re-direction of light occurs ***prior to*** the equipped vehicle entering the turn. (*Id.*)

¶[0040].) Thus, in the headlight system embodiment of Figure 11 of Alden, the re-direction of the light emitted by headlights 155 does not occur *until the steering wheel is turned when the equipped vehicle enters the curve.* (Ex. 2001, ¶68.) Alden therefore fails to teach the independent claim 1 elements of “*control at least a first plurality of the LED light sources to provide light based at least in part on the determined light change and prior to the motor vehicle reaching the road curvature.*”

Kobayashi also fails to teach the predictive aspect of the Control Limitation of independent claim 1. In connection with the discussion of Figure 10 depicting a vehicle K traversing a curved road, Kobayashi **expressly states:** “*[w]hen the vehicle turns to the left, the left shoulder is illuminated*” and “*[w]hen the vehicle turns to the right, the right shoulder is illuminated.*” (Ex. 1006, 15:21-23, emphases added, Figure 10.) Thus, as in Alden, re-direction of the light emitted by the headlights of Kobayashi’s vehicle K does not occur *until the vehicle has entered the curve — not prior to the curve, as required by claim 1.*⁷ (Ex. 2001, ¶69.) As a result, like Alden,

⁷Petitioner quotes this very language from Kobayashi (Petition at 23) but simply ignores its clear teaching, instead inexplicably asserting that such language supports the exact opposite conclusion, *i.e.*, that Kobayashi teaches re-directing light

Kobayashi fails to teach the Control Limitation of independent claim 1 — “**control at least a first plurality of the LED light sources to provide light based at least in part on the determined light change and *prior to the motor vehicle reaching the road curvature***.”⁸ Here again, because neither Alden nor Kobayashi teaches the Control Limitation of independent claim 1, any combination of those references would fail to result in the claimed invention recited therein. Petitioner’s obviousness contentions therefore again fail. *See, e.g., Kinetic Concepts*, 688 F.3d at 1361; *see also, e.g., In re Royka*, 490 F.2d 981.

The requirements for demonstrating obviousness are well-established and Petitioner bears the burden of proof. Petitioner has however offered nothing more than conclusory statements, without any articulated reasoning with a rational underpinning to support those statements. Petitioner has had ample time and opportunity to meet its burden of proof and, having failed to do so, should not now

emitted by the headlights of the vehicle K in advance of a road curve. (*Id.*, at 30.)

For the reasons set forth above, Petitioner’s assertion is incorrect.

⁸Once again, Kobayashi’s discussion of controlling the (lateral) range of light emitted by vehicle headlights relates only to road intersections (also referred to as branches), which Kobayashi expressly distinguishes from road curves. (Ex. 1006, 14:53-16:56, Figure 11; Ex. 2001, ¶69.)

be assumed to have proffered arguments not expressly included nor identified with particularity in its Petition, nor be heard to plead for leave to file a reply to Patent Owner's Preliminary Response when that Response has simply demonstrated the failure of Petitioner's contentions rather than raised any new issues. Indeed, Petitioner is "master of its complaint." *SAS Institute, Inc v. Iancu*, 138 S. Ct. 1348, 1355 (2018). The Board is constrained by the arguments and evidence presented and developed in the Petition and is not at liberty to "raise, address, and decide . . . theories never presented by [Petitioner] and not supported by record evidence." *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1381 (Fed. Cir. 2016).

2. Petitioner's Combination of Alden and Kobayashi Fails to Teach the Independent Claim 12 Predictive Illumination Determination and Control Limitations

Similar to independent claim 1, independent claim 12 includes a Predictive Illumination Determination Limitation recited as "determine a light change, the change adapting a light pattern of the headlamps in at least one of color, intensity or spatial distribution to **increase light in a direction of the road curvature ahead of the motor vehicle** and **shaping light based at least in part on the road curvature.**" (Ex. 1001, Claim 12.) Also, similar to independent claim 1, independent claim 12 also includes a Control Limitation recited as "**control at least a first plurality of the LED light sources to provide light based at least in part on the determined light change and prior to the motor vehicle reaching the road curvature.**" (*Id*; Ex. 2001,

¶70.)

Petitioner's obviousness contentions relating to independent claim 12 are the same as those relating to independent claim 1. That is, Petitioner relies on a combination of Alden and Kobayashi, including a combination of incompatible features from the different headlight system embodiments discussed in Alden. (Petition at 31-32; Ex. 2001, ¶71.) Petitioner's obviousness contentions relating to independent claim 12 therefore fail for the same reasons as those set forth above in connection with independent claim 1. (*See*, Response, §VII.A.1., *supra*.)

In that regard, having failed to explain *why* a POSA would have found it obvious to combine those embodiments, any contentions by Petitioner of obviousness based thereon fail. *KSR*, 550 U.S. at 418. (*See*, Response, §VII.A.1., *supra*.) Additionally, because the features from the different headlight system embodiments of Alden are incompatible, Petitioner's combination of Alden's embodiments would render any resulting headlight system inoperable or unsatisfactory for its intended purpose and change its principle of operation -- making it an unsuitable option. (Ex. 2001, ¶72.) As a result, one of ordinary skill would not be motivated to combine Alden and Kobayashi as Petitioner contends and, indeed, the teachings of Alden and Kobayashi are insufficient to render the claimed invention obvious. *Intel Corp. v. PACT*, 61 F.4th at 1381; *In re Gordon*, 733 F.2d at 902; *In re Ratti*, 270 F.2d at 813. (*See*, Response, §VII.A.1., *supra*.)

Moreover, despite Petitioner's inaccurate and misleading annotation of Figure 5, Alden fails to teach the independent claim 12 elements relating to increasing light in a direction of a road curvature. Petitioner's obviousness contentions therefore fail. *KSR Int'l*, 550 U.S. at 418; *Raytheon*, 993 F.3d at 1381; *Scripps Clinic*, 927 F.2d at 1576 (*overruled on other grounds by Abbott Labs.*, 566 F.3d at 1293); *ActiveVideo*, 694 F.3d at 1327. (See, Response, §VII.A.1., *supra*.) Alden and Kobayashi also both fail to teach the independent claim 12 elements directed to shaping light, nor instructions that enable a processor to control LED light sources to provide a determined light change prior to the equipped vehicle reaching a road curvature, as required by the Control Limitation. Because neither Alden nor Kobayashi teaches these independent claim 12 limitations, any combination of those references would fail to result in the claimed invention recited therein. Petitioner's obviousness contentions therefore fail. See, e.g., *Kinetic Concepts*, 688 F.3d at 1361; see also, e.g., *In re Royka*, 490 F.2d 981. (See, Response, §VII.A.1., *supra*.)

3. Petitioner's Combination of Alden and Kobayashi Fails to Teach the Independent Claim 23 Predictive Illumination Determination and Control Limitations

Similar to independent claim 1, independent claim 23 includes a Predictive Illumination Determination Limitation recited as "determining a light output, the output adapting a light pattern of the headlamps in at least one of color, intensity or spatial distribution to increase light in a direction associated with the [road] shape

change ahead of the motor vehicle and *shaping* light based on the [road] shape change.” (Ex. 1001, Claim 23.) Also similar to independent claim 1, independent claim 23 also includes a Control Limitation recited as “**prior to reaching the road shape change, causing** at least a first plurality of the LED light sources to provide light based at least in part on the determined light output.” (*Id.*)

Petitioner’s obviousness contentions relating to independent claim 23 are the same as those relating to independent claim 1. That is, Petitioner relies on a combination of Alden and Kobayashi, including a combination of incompatible features from the different headlight system embodiments discussed in Alden. (Petition at 32-33; Ex. 2001, ¶76.) Petitioner’s obviousness contentions relating to independent claim 23 therefore fail for the same reasons as those set forth above in connection with independent claim 1. (*See*, Response, §VII.A.1., *supra.*)

In that regard, having failed to explain *why* a POSA would have found it obvious to combine those embodiments, any contentions by Petitioner of obviousness based thereon fail. *KSR*, 550 U.S. at 418. (*See*, Response, §VII.A.1., *supra.*) Additionally, because the features from the different headlight system embodiments of Alden are incompatible, Petitioner’s combination of Alden’s embodiments would render any resulting headlight system inoperable or unsatisfactory for its intended purpose and change its principle of operation -- making it an unsuitable option. (Ex. 2001, ¶77.) As a result, one of ordinary skill

would not be motivated to combine Alden and Kobayashi as Petitioner contends and, indeed, the teachings of Alden and Kobayashi are insufficient to render the claimed invention obvious. *Intel Corp. v. PACT*, 61 F.4th at 1381; *In re Gordon*, 733 F.2d at 902; *In re Ratti*, 270 F.2d at 813. (See, Response, §VII.A.1., *supra*.)

Moreover, despite Petitioner's inaccurate and misleading annotation of Figure 5, Alden fails to teach the independent claim 23 elements relating to increasing light in a direction associated with a road shape change. Petitioner's obviousness contentions therefore fail. *KSR Int'l*, 550 U.S. at 418; *Raytheon*, 993 F.3d at 1381; *Scripps Clinic*, 927 F.2d at 1576 (overruled on other grounds by *Abbott Labs.*, 566 F.3d at 1293); *ActiveVideo*, 694 F.3d at 1327. (See, Response, §VII.A.1., *supra*.) Alden and Kobayashi also both fail teach the independent claim 23 elements directed to shaping light, and causing LED light sources to provide a determined light change prior to the equipped vehicle reaching a road shape change. Because neither Alden nor Kobayashi teaches these independent claim 23 elements, any combination of those references would fail to result in the claimed invention recited therein. Petitioner's obviousness contentions therefore fail. See, e.g., *Kinetic Concepts*, 688 F.3d at 1361; see also, e.g., *In re Royka*, 490 F.2d 981. (See, Response, §VII.A.1., *supra*.)

B. Ground 2: Petitioner's Combination of Alden, Kobayashi and Beam Fails to Teach All of the Limitations of Claims 9, 20 and 31

For the reasons detailed in Section VII(A) *supra*, the combination of Alden and Kobayashi fails to teach the Predictive Illumination Determination and Control Limitations of independent claims 1, 12 and 23. The Petition’s optional inclusion of the Beam reference —“Alden (alone or with Beam) in view of Kobayashi” — fails to satisfy the missing claim limitations in dependent claims 9, 20 and 31. (Petition at 5; Ex. 2001, ¶ 80.)

The combination of Alden, Kobayashi and Beam *inter alia* does not teach “one or more processors to: “determine a light change ... **to increase light** in a direction of the road curvature **ahead** of the motor vehicle” as required in claims 9, 20 and 31. (Ex. 2001, ¶81.) Simply put, Beam discloses a headlamp that provides “the equivalent of **high beam headlights or brighter on at all times**, greatly enhancing the ability to see at night” except for areas where incoming light is detected. (Ex. 1005, 6:53-56.) Beam further discloses that “[t]he resulting beam is at **full intensity** except in areas that would dazzle a driver ahead.” (Ex. 1005, 4:57-59.) Since Beam discloses providing **maximum intensity** light everywhere it could be needed, there would be no reason to **increase light** or provide the ability to change the direction of microbeams in the Beam system. (Ex. 2001, ¶81.) Accordingly, the Ground 2 combination also fails to establish obviousness of claims 9, 20 and 31.

VIII. The Board Should Deny Institution on Procedural Grounds

A. Petitioner’s Serial Petitions Raise Fairness and Efficiency Concerns Under § 316

In coordination with Unified Patents, LLC (“Unified”) and/or Volkswagen Group of America, Inc. (“VW”), Petitioner Mercedes uses serial petitions to allow Mercedes to review Preliminary Responses and institution decisions before filing its petitions — thereby flouting ethics rules, increasing inefficiencies, and creating unnecessary burden on the Board and Patent Owner. The Board should deny institution.

1. The Unified/Volkswagen/Mercedes Coordinated Serial Filing Strategy

On June 7, 2022, the ’029 Patent and U.S. Patent Nos. 9,955,551 (“’551 Patent”) and 10,894,503 (“’503 Patent”) were asserted in a District of Delaware lawsuit against Petitioner Mercedes, Volkswagen Group of America, Inc. (“VW”), Porsche Cars North America, Inc. (“Porsche), and others. (Petition at 3.) The following §103 challenges to the ’029 Patent were subsequently filed.

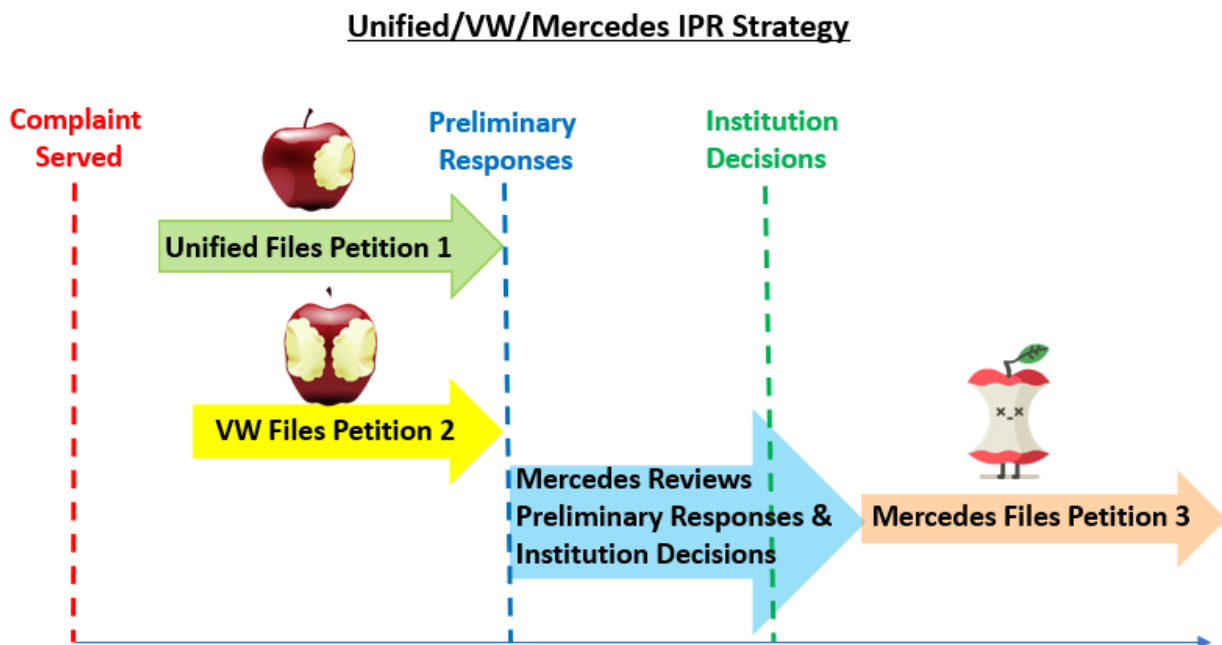
On September 22, 2022, Unified Patents, LLC (“Unified”) filed a Petition in IPR2022-01500 (“Unified IPR”) challenging (1) claims 2, 12, 13, 23, and 24 based on Gotou in view of Harbers, and (2) claims 1, 2, 10-13, 23, and 24 based on Heinz in view of Gotou or in view of Gotou and Harbers. (IPR2023-01500, Paper at 6). On

February 8, 2023, Patent Owner filed a Preliminary Response and on May 4, 2023 the Board instituted. (IPR2023-01500, Papers 8, 15.)

On October 3, 2022, VW filed a Petition in IPR2022-01586 (“VW IPR”) challenging claims 1-33 based on (1) Beam in view of Kobayashi, and (2) Gotou in view of Karlsson. (IPR2023-01586, Paper 1 at 4.) On February 28, 2023, Patent Owner filed a Preliminary Response and on May 29, 2023 the Board instituted. (IPR2023-01586, Papers 6, 7.)

On June 8, 2023, after being able to review the Preliminary Responses and Institution Decisions in the Unified and VW IPRs, Mercedes filed this Petition. Mercedes challenges (1) claims 1-8, 10-19, 21-30, and 32-33 based on Alden in view of Kobayashi, and (2) claims 9, 20, and 31 based on Alden (alone or with Beam) in view of Kobayashi. (Petition at 5.)⁹ This coordinated serial strategy is illustrated below:

⁹ Also, on June 22 and 23, 2023, Porsche and Mercedes filed “me-too” petitions asserting the same grounds asserted by VW in IPR2022-01586. (IPR2023-01122, Paper 2; IPR2023-01126, Paper 2.)



Unified subsequently offered to dismiss the Unified IPR and it was terminated on September 6, 2023. (IPR2022-01500, Papers 25, 26.)

B. Mercedes' Serial Petition Should Be Denied Institution Under 35 U.S.C. § 314

In *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 15–16 (PTAB Sept. 6, 2017) (precedential), the Board articulated a non-exhaustive list of factors to be considered in determining whether to exercise discretion under § 314(a) to deny a petition that challenges the same patent as a previous petition. *Valve Corp. v. Electronic Scripting Products, Inc.*, IPR2019-00062, Paper 11 at 2 (PTAB April 12, 2019) (precedential).

1. First *GP* Factor

The first *General Plastic* (“*GP*”) factor is “whether the same petitioner previously filed a petition directed to the same claims of the same patent.” In *Valve*, the PTAB extended the first *GP* Factor to include different, but similarly situated petitioners, such as real-parties-in-interest or co-defendants in litigation:

[A]pplication of the *General Plastic* factors is not limited solely to instances when multiple petitions are filed by the same petitioner. Rather, when different petitioners challenge the same patent, we consider any relationship between those petitioners when weighing the *General Plastic* factors.

Valve at 9 (citation omitted).

As to the real-party-in-interest issue addressed below, the Director in *Unified Patents, LLC v. MemoryWeb, LLC*, IPR2021-01413, (PTAB May 22, 2023) held as follows:

The Board can and should make a determination of the real parties in interest or privity in any proceeding in which that determination may impact the underlying proceeding, for example, but not limited to, a time bar under 35 U.S.C. § 315(b) or an estoppel under 35 U.S.C. § 315(e) that might apply.

(*Unified Patents, LLC v. MemoryWeb, LLC*, IPR2021-01413, Paper 76 at 5.)

As set forth below, Patent Owner submits Mercedes’ petition should be denied as an improper serial petition, because *inter alia* Mercedes was a real party in interest

or privity in the Unified IPR. Accordingly, per the Director’s guidance, the Board should confirm whether Mercedes was a real party in interest or privity, because that determination will impact this IPR.

a. Mercedes Was the Real-Party-in-Interest (“RPI”) in the Unified IPR – *i.e.*, the Same Petitioner

When VW and Mercedes are co-defendants in related litigation, VW and Mercedes have a history of coordinating serial IPR petitions – with or without Unified. In *Applications in Internet Time, LLC v. RPX Corp.*, 897 F.3d 1336 (Fed. Cir. 2018) (“*AIT*”), the Federal Circuit held a non-party is the real-party-in-interest (“RPI”) – *i.e.* the petitioner – when it “is a clear beneficiary that has a preexisting, established relationship with the petitioner.” *Id.* at 1351. In deciding whether a non-party is the RPI, Boards can take into account “whether a non-party ‘funds and directs and controls’ an IPR petition or proceeding; the non-party’s relationship with the petitioner; the non-party’s relationship to the petition itself, including the nature and/or degree of involvement in the filing; and the nature of the entity filing the petition.” *Id.* at 1354.

Mercedes was the RPI in the Unified IPR. Specifically, Unified represents it pursues post-grant challenges on behalf of its members – *i.e.*, “deterrent activities” – including *inter partes* reviews. (See IPR2022-01500, Ex. 1014 at ¶¶1-3.) To fund such services, a Unified member, such as Mercedes, subscribes to “technology-

specific NPE zones,” e.g. the Automotive or Transport Zone, and “pay a yearly subscription fee to a specific NPE technology zone” (*Id.*, at ¶2.) and “[a]ll services [are] included in yearly fees” (*See* IPR2022-01500, Ex. 2005 at 1.) The “subscription fee” paid by a member with respect to one zone are not used by Unified for activities for other zones. (*See* IPR2022-01500, Ex. 1014 at ¶2.)

Members are the only beneficiaries of such activities. Unified offers only post-grant challenge services and does not make or sell products. Just like in *AIT*, it is the RPI, Mercedes, that is accused of infringing the ’029 Patent in the district court litigation, not Unified. *See AIT*, 897 F.3d 1336 at 1354. While Mercedes would have been the clear beneficiary of a finding of invalidity in the Unified IPR, such a finding would not have benefited Unified other than by motivating Mercedes and other members to continue paying fees to fund such proceedings on their behalf. Mercedes was also the clear beneficiary by being able to review the Unified IPR Preliminary Response and institution decision before filing this petition.

Further, as noted in *AIT*, Wright & Miller [§1553] explains: “As a general rule, a person who is an attorney-in-fact or an agent solely for the purpose of bringing suit is viewed as a nominal rather than a real party in interest...” *AIT*, 897 F.3d at 1357. In the present case Unified was merely acting as “an extension of the client’s [i.e., Mercedes] in-house legal team” to help “selectively clear” liability for

infringement as part of its “patent risk management solutions.” *Id.*¹⁰

Mercedes was the RPI in the Unified IPR – *i.e.*, the petitioner for the purposes of the serial petition issue at hand.

¹⁰ Also, as noted by the Patent Owner in its Unified IPR Preliminary Response, despite Unified’s burden to prove Mercedes was not an RPI, Unified failed to do so. (IPR2022-01500, Paper 8 at 43, 45-46.) Instead, Unified’s CEO, Kevin Jakel, provided superficial details about Unified’s business and conclusorily asserted its members were not involved in the preparation of, payment for, or decision to file the Petition and that Unified had identified all RPIs. *Id.*

However, the Federal Circuit has held “that the Board conduct a critical assessment” of Unified given its business model and that “[s]uch a critical assessment is especially warranted in a case in which a petitioner’s entire business model is to challenge patents on behalf of others.” *See Fall Line Patents, LLC v. Unified Patents, LLC*, 818 F. App’x 1014, 1018 n.1 (Fed. Cir. 2020.) Further, the Federal Circuit and USPTO have held the Board cannot accept a party’s declaration of its interest in the proceeding at face value—the party must provide the underlying evidence necessary to make a critical assessment possible. *See AIT*, 897 F.3d at 1354 (faulting the Board for “its decision to accept at face value RPX’s explanation of its own interest in the IPRs”); *RPX Corporation v. Applications in Internet Time, LLC*, IPR2015-01750, Paper 128 at 6 (PTAB October 2, 2020) (precedential) (noting it is necessary to “address expressly the record evidence” and not accept Petitioner’s representations at face value).

b. Mercedes Was Also, and Alternatively, a Similarly Situated Defendant in the VW IPR—*i.e.*, the Same Petitioner

Mercedes is also a similarly situated defendant in the VW IPR2022-01586 for the '029 Patent—providing another basis for institution denial. In *Shenzhen Silver Star Intelligent Tech. v. iRobot Corp.*, the PTAB denied institution of Shenzhen Silver Star's IPR petition in view of an earlier challenge to the same patent by a different petitioner:

Given petitions filed by two or more similarly situated defendants, there is a rebuttable presumption that a later-filed petition will be denied under General Plastic if that later-filed petition is filed after an earlier-filed petition has received a preliminary response or a decision on institution.

The concept behind this is that, things being equal, if two or more co-defendants are sued around the same time, they should, within reason, file their petitions around the same time; it is generally unfair for one defendant to wait for a "test case" to go through the *inter parties* review process by another defendant before filing their own petition.

Shenzhen Silver Star Intelligent Tech. v. iRobot Corp. IPR2018-00761, Paper 15 at 16-17 (PTAB September 5, 2018).

As described above, Mercedes and VW were both sued in the same case for infringement of the '029 Patent on June 7, 2022. (See IPR2023-01039, Ex. 2013 at ¶¶8,18,20,61-67,86-92.) Further, both were sued based on the same type of headlight

technology.¹¹ In fact, the VW and Mercedes headlights at issue were both developed jointly with the same German automotive parts supplier, Hella KGaA Hueck & Co. (See IPR2023-01039, Exs. 2007-2008; Exs. 2010, 2012 regarding the 25 and 84 LED systems of VW and Mercedes detailed in the Complaint; Ex. 2013 at ¶¶8, 18, 20, 62-66, 87-91.) Accordingly, VW and Mercedes have closely aligned interests and are similarly situated parties – *i.e.*, they are same petitioner for purposes of the first *GP* factor.

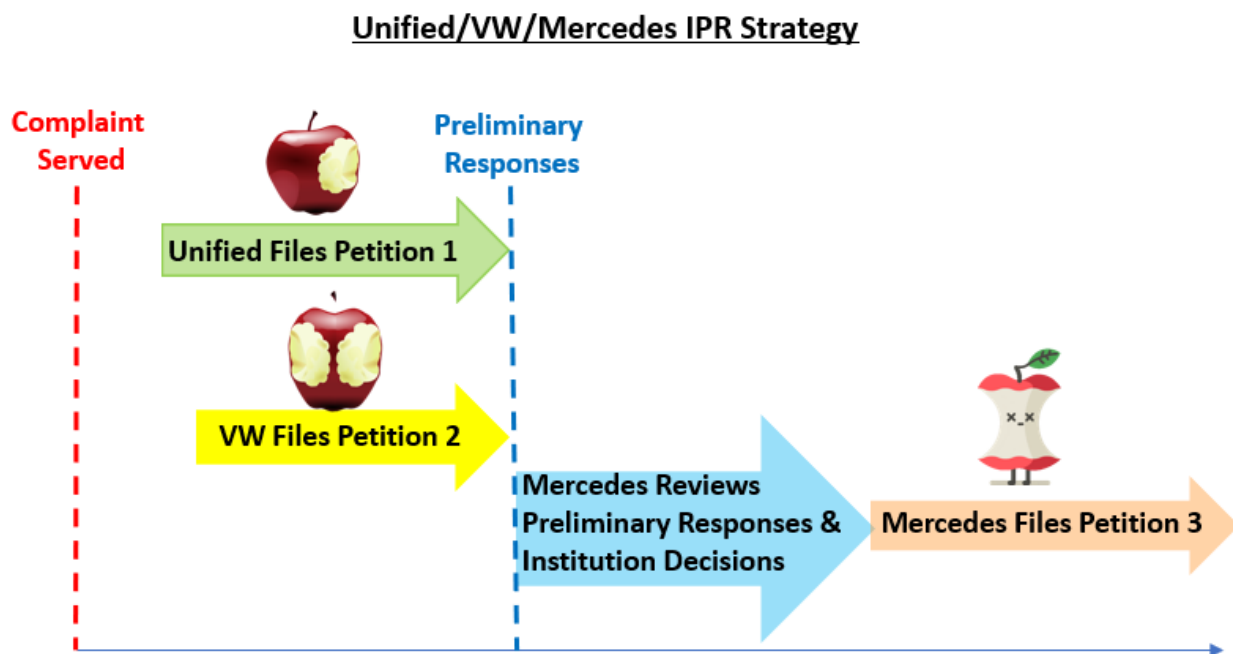
c. Unified, Volkswagen, and Mercedes Have A History of Coordinated Serial Filings

When Volkswagen and Mercedes are co-defendants in related litigation, VW and Mercedes have a history of coordinating serial IPR petitions – with or without

¹¹A vehicle headlight comprising a plurality of LED light sources. one or more processors, and a memory storing instructions that, when executed by one or more processors, enable the one or more processors to receive first data, including map data, indicating an upcoming road curvature, determine a light change of adapting a light pattern of the headlamps in at least one of color, intensity or spatial distribution to increase light in a direction of the road curvature, and shaping light based on the road curvature, and control the LED light sources to provide light based on the determined light change and prior to the motor vehicle reaching the road curvature.

(See IPR2023-01039, Ex. 2013 at ¶¶8, 18, 20, 62-66, 87-91.)

Unified. In each such case, VW, or Unified and VW, files a first wave of IPR petitions. Then, after receiving and being able to analyze at least Patent Owner's preliminary response, Mercedes files at least one serial petition. This strategy is illustrated below:



For example, after Arigna sued VW and Mercedes, VW filed IPR2022-00147 challenging US 7,049,850 on November 9, 2021; and Unified Patents, LLC filed IPR2022-00285 challenging the same '850 Patent on December 9, 2021. After the Patent Owner filed a Preliminary Response (Paper 7) in the '285 IPR on March 21, 2022, Mercedes filed its serial petition in IPR2022-01031 challenging the '850 Patent on May 18, 2022.

As another example, after Carucel Investments sued Volkswagen and Mercedes, Volkswagen filed a first wave of IPR petitions. Mercedes later filed a

second wave of petitions, but only after Patent Owner filed Preliminary Responses to VW's first wave. More specifically, Volkswagen filed IPR2019-01101 challenging US 7,221,904 on May 20, 2019, and Carucel filed a preliminary response (Paper 6) on September 5, 2019. Over two weeks later, Mercedes filed IPR2019-01635 challenging the '904 Patent on September 21, 2019. Volkswagen also filed two IPR petitions (IPR2019-01105 and IPR2019-01106) on May 20, 2019 challenging US 8,718,543. Carucel filed preliminary responses in both proceedings on September 5, 2019. (*See Volkswagen Group of America, Inc., d/b/a Audi of America, Inc. v. Carucel Investments, LP.*, IPR2019-01105, -01106, Paper 6.) Over two weeks later, on September 23, 2019, Mercedes filed a petition in IPR2019-01644 challenging the same '543 Patent.

While *Shenzhen* in conjunction with *General Plastic* hold that such similarly situated defendants should file their IPR petitions "around the same time," and should not wait for one defendant's petition to be a "test case" before the other defendant files their own petition, VW and Mercedes have ignored these decisions. The same logic should hold true for a real-party-in-interest. Mercedes could have filed its Petition at or around the same time as VW or Unified but chose to wait for the opportunity to review Patent Owner's preliminary Responses and the institution decisions in both cases (and in other related patent IPRs as explained below) — a strategy Mercedes has employed in the past as explained above.

Accordingly, the first *GP* factor weighs against institution. *See also Valve Corp. v. Elec. Scripting Prods., Inc.*, IPR2019-00062, -00063, -00084, Paper 11 at 10 (PTAB Apr. 2, 2019) (precedential). Similar to this case, the Board found a significant relationship, and the first *GP* factor weighed against institution, where Valve and HTC were co-defendants in the same litigation, both were accused of infringing the same patent, and the litigation was based on the same technology licensed from Valve to HTC.

2. Second *GP* Factor

The second *GP* factor is “whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it.” This factor includes considering whether prior art relied on in the later petition “could have been found with reasonable diligence.” *General Plastic* at 11.

Mercedes clearly knew or should have known of Beam and Kobayashi asserted in this IPR because they were cited and analyzed by VW and the Board in the IPR2022-01586 regarding the ’029 Patent prior to this IPR, and were also cited and analyzed by VW in IPR2023-00197, IPR2023-00315, IPR2023-00318, IPR2023-00328, and IPR2023-00335 petitions filed on November 30, December 9, December 22, December 16, and December 23, 2022 as to the related ’551 and ’503 Patents.

As for Alden (Ex. 1005) it was published in 2003 and is entitled “Segmented Distributed Headlight System, Method, And Apparatus.” Further, Mercedes quotes Alden as purportedly teaching a ““segmented light distribution system”” that can provide “illumination to independently controlled segments each operable within a range of intensities between the high beam and low beam state”” and that a vehicle can ““emit[] a low beam illumination 35 in a first headlight distribution sector while concurrently emitting a high beam, illumination 37 in a second highlight distribution sector,”” with ““[t]he low beam illumination being emitted in response to the detection of an oncoming vehicle 33’ to reduce ‘glare.’” (Petition at 10.)

Accordingly, Patent Owner submits that Alden could have easily been found through any reasonable search – *i.e.*, they “could have been found with reasonable diligence.”

The second *GP* factor weighs against institution.

3. Third *GP* Factor

The third *GP* factor is “whether at the time of filing of the second petition the petitioner already received the patent owner’s preliminary response to the first petition or received the Board’s decision on whether to institute review in the first petition.” At the time of filing this petition on June 7, 2023, Mercedes had already received the Patent Owner’s preliminary responses and the institution decisions in both the Unified and VW IPRs regarding the ’029 Patent. *General Plastic* at 17

recognized this provides a “potential benefit from receiving and having the opportunity to study Patent Owner’s Preliminary Response, as well as our institution decisions on the first-filed petitions, prior to its filing of follow-on petitions.”

In fact, the Patent Owner’s preliminary responses in the VW IPRs provided a clear roadmap for Mercedes to drop Beam as a primary reference for the independent claims.

In the May 29, 2023 institution decision in IPR2022-01586 regarding the ’029 Patent, the Board rejected VW’s Beam-Kobayashi Ground, but instituted based on a redundant Gotou-Karlsson Ground. The Board found that “Beam’s disclosures cast doubt on Petitioner’s combination” of Beam and Kobayashi. (*See* IPR2022-01586, Paper 7 at 20.) Specifically, the Board determined that:

While Beam does allow controlling its illumination, it does so according to a strategy that starts with the maximum illumination and reduces it where necessary to protect drivers of oncoming vehicles. Petitioner has not explained how that approach would allow Beam to implement a command to increase light in the direction of road curvature. While Petitioner notes that Beam discloses controlling “the angular position” of its LEDs (Pet. 26 (citing Ex. 1005, code (57)), 36–37 (same)), Beam’s control is within the context of providing maximum overall illumination, reduced in areas where necessary to prevent glare (e.g., Ex. 1005, 1:1–4, 2:60–62, 6:11–12, 6:54–55).

(IPR2022-01586, Paper 7 at 20.)

With this knowledge, Mercedes crafted the Petition in this IPR and dropped Beam as a primary reference for the independent claims.

Such a strategy was denounced in *General Plastic* at 17: “As discussed in our Decisions Denying Institution, we are concerned here by the shifts in the prior art asserted and the related arguments in follow-on petitions. Multiple, staggered petitions challenging the same patent and same claims raise the potential for abuse.”

The third *GP* factor weighs against institution.

4. Fourth *GP* Factor

The fourth *GP* factor is “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.” *General Plastic* at 17.

Mercedes knew or should have known of the Beam and Kobayashi references at least 6 months before filing the Petition in the present IPR because, as explained above, they were cited in many other Volkswagen IPR petitions. While Mercedes has not taken a position as to when it learned of Alden, as noted above Alden could have easily been found through any reasonable search conducted at any time since the district court complaint was filed on June 7, 2022 – over one year before Mercedes’ Petition.

The fourth *GP* factor weighs against institution.

5. Fifth *GP* Factor

The fifth *GP* factor is “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.” Petitioner Mercedes did not provide any such explanation in the Petition.

The fifth *GP* factor weighs against institution.

6. Sixth *GP* Factor

Pursuant to the sixth *GP* factor, the Board must consider “the finite resources of the Board.”

First, as noted in *General Plastic* at 21, “staggered petition filings ... are an inefficient use of the *inter partes* review process and the Board’s resources.”

Second, the *GP* factors list is “a non-exhaustive list of factors to be considered,” *Valve* at 2, i.e., gamesmanship can be considered.

Recognizing that “[t]wo or more petitions filed against the same patent ... may place a substantial and unnecessary burden on the Board ...,” and the serial petition gamesmanship employed by Unified/VW/Mercedes, Patent Owner submits the sixth *GP* factor weighs against institution. *See Consolidated Trial Practice Guide*, November 2019 (“CTPG”) at 59.

7. Seventh *GP* Factor

The seventh *GP* factor considers “the requirement under 35 U.S.C.

§ 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review.” It appears this is the only factor that does not weigh against institution.

For the reasons stated above, six of the seven *GP* factors weigh against VW/Mercedes’ serial petition strategy. Petitioner Mercedes’ coordinated serial petition strategy is just the kind of abuse should not be permitted. As stated in *General Plastic*, at 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].” Institution should be denied.

IX. Conclusion

In light of the remarks herein, Patent Owner respectfully requests that the Board deny the Petition for *inter partes* review of the ’029 Patent.

Respectfully submitted,

Dated: October 24, 2023

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Certificate of Service

The undersigned hereby certifies that the foregoing **PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION FOR *INTER PARTES* REVIEW UNDER 37 C.F.R. § 42.107**, including any attachments and exhibits, was served in its entirety on **October 24, 2023** upon the following parties by electronic mail:

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Certificate of Compliance Pursuant to 37 C.F.R. § 42.24

This paper complies with the type-volume limitation of 37 C.F.R. § 42.24. The paper contains 11,818 words, excluding the parts of the paper exempted by § 42.24(a).

This paper also complies with the typeface requirements of 37 C.F.R. § 42.6(a)(ii) and the type style requirements of § 42.6(a)(iii)&(iv).

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