

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MERCEDES-BENZ USA, LLC,
Petitioner

v.

YECHEZKAL EVAN SPERO,
Patent Owner.

IPR2023-01027
Patent 10,894,503 B2

Before JASON W. MELVIN, AARON W. MOORE, and
MICHAEL T. CYGAN, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. *Background*

Mercedes-Benz USA, LLC (“Petitioner”) filed a Petition requesting *inter partes* review of claims 37–70 of U.S. Patent No. 10,894,503 B2 (Ex. 1001, the “’503 patent”). Paper 2 (“Pet.”). Yechezkal Evan Spero (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”).

We may institute an *inter partes* review if “the information presented in the petition . . . and any response . . . 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) (2018).

For the reasons provided below, and based on the record as it now stands, we determine that Petitioner has demonstrated a reasonable likelihood that it will prevail in showing the unpatentability of at least one challenged claim. Accordingly, we institute *inter partes* review.

B. *Related Proceedings*

Petitioner also filed an earlier Petition, challenging claims 1–36 of the ’503 patent. *See* IPR2023-01026, Paper 2, 1.

The parties identify two civil actions, *Torchlight Techs. LLC v. Daimler AG, et al.*, No. 1:22-cv-00751 (D. Del.),¹ and *Torchlight Techs. LLC v. General Motors LLC, et al.*, No. 1:22-cv-00752 (D. Del.), as related matters. *See* Pet. 3: Paper 4, 1.

The parties also identify as related IPR2023-00197 (challenging ’503 patent claims 20–25 and 59–64), IPR2023-00328 (challenging ’503 patent claims 26–36 and 65–70), IPR2023-00335 (challenging ’503 patent claims 1–

¹ Daimler AG became Mercedes-Benz Group AG on February 1, 2022. *See* Pet. 3 n.1.

19 and 37–58); and IPR2023-01231 (seeking to join IPR2023-00197). *See* Pet. 3; Paper 4, 1–2. We also note that motions for joinder have been filed in IPR2023-01320 and IPR2023-01321, seeking to join IPR2023-00328 and IPR2023-00335, respectively.

Patent Owner also identifies a number of other post-grant proceedings involving patents in the same family as the '503 patent. *See* Paper 4, 2–3.

C. The '503 Patent

The '503 patent is titled “Detector Controlled Headlight System” and is directed to “[a]n automated headlight system for vehicles [that] replaces the high and low beam with a continuum of beam patterns, with further variable spatial distribution of intensities and color spectrum.” Ex. 1001, Abstract. The embodiment that corresponds to the challenged claims is depicted in Figure 15, reproduced in part below:

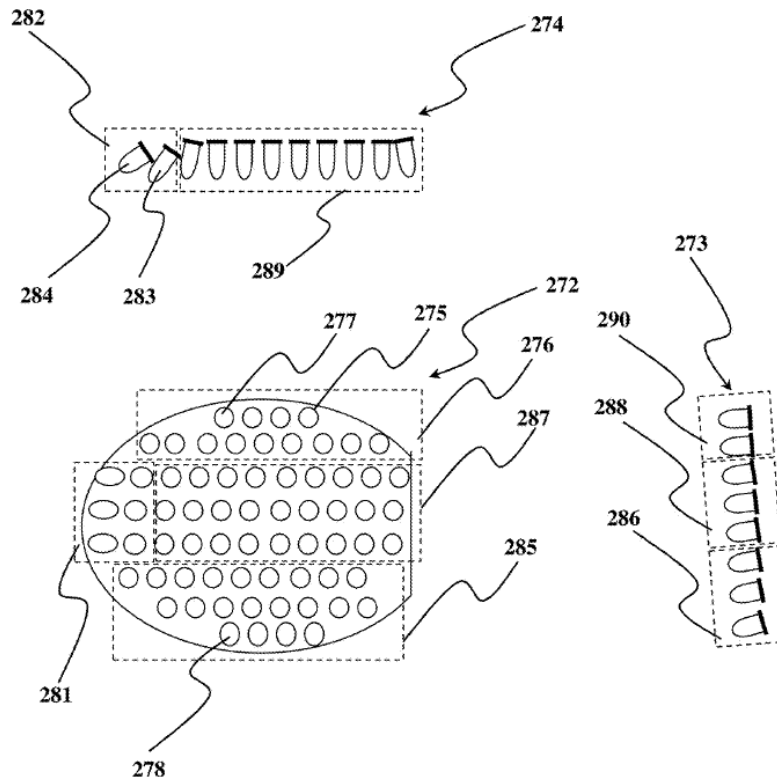


Figure 15 shows a “multiple light-source headlamp.” Ex. 1001, 15:64.

The figure depicts “a headlamp 270 of a land, sea or air vehicle . . . in front view 272, side view of a section 273 and top view of a section 274.”

Ex. 1001, 53:17–19.

A solid-state light source, “such as an LED 275 with [a] specific location within the cluster 276 has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left.” Ex. 1001, 53:19–23.

Different LED 277, which is “at a second location within the same cluster[,] may have a similar or dissimilar aiming, wavelength and spatial light distribution.” *Id.* at 53:19–32.

The patent explains that, because drivers may find yellow colored headlamps less offending than blueish colors, a controller that “receives traffic data from sensors” can “shift wavelength specific radiant power contributions of SLSs such that the resultant on the CIE chromacity diagram would be yellowish” but that if “there is no car immediately ahead or oncoming traffic,” then the controller can shift the color to “bluish white, allowing the driver to better ascertain road conditions further up ahead.” Ex. 1001, 53:53–62.

Of the challenged claims, claims 37, 59, and 65 are independent and are directed to vehicle headlight systems. Claim 37 is reproduced in full below:

1. A vehicle headlight system comprising:
 - one or more headlamps affixable to a first vehicle;
 - a plurality of light clusters arranged in each of the one or more of the headlamps and capable of illuminating sub-sections of a field-of-view with different illumination characteristics, wherein at least two of the light clusters operate to create a headlight beam;

one or more sensors configured to obtain and provide sensor data, at least a portion of the sensor data indicating a second vehicle within the field-of-view; and

at least one processor configured to:

receive the sensor data;

process the sensor data to determine a light distribution pattern for an adaptive headlight beam, such that a headlight beam adapted to the pattern substantially illuminates a first subsection of the field-of-view including at least a portion of the second vehicle with an illuminance below a predefined threshold value, while the beam substantially illuminates at least the one or more second subsections of the field-of-view to either side of the first subsection with an illuminance above the predefined threshold value; and

instruct operation of at least two of the light clusters to create the adapted headlight beam.

Independent claim 59 recites a system similar to that of claim 37, except that it requires that each headlamp include at least three directional light sources having different aimings relative to the vehicle:

59. A vehicle headlight system, comprising:

one or more headlamps affixed to a first vehicle, each headlamp including at least three directional light sources having different aimings relative to the first vehicle, the light sources having one or more controllable illumination characteristics;

one or more sensors configured to sense information, at least a portion of the sensed information indicating a second vehicle, and communicate sensor data reflecting the sensed information to at least one processor, wherein the at least one processor is configured to:

process the sensor data to identify a first subsection, of a field of view, that includes at least a portion of the second vehicle;

determine light output for the headlight system that aims illumination at the first subsection, the illumination aimed at the first subsection substantially resulting in light below a first predefined illuminance in the first subsection, and that aims illumination at one or more second subsections of the field of view to either side of the first

subsection, the illumination aimed at the one or more second subsections substantially resulting in light above the first predefined illuminance in the one or more second subsections; and

instruct adjustment of one or more of the light sources to achieve the determined output.

Independent claim 65 is a method claim that generally corresponds to the subject matter of claim 37:

65. A method for generating a headlight beam in an adaptive headlight system that provides illumination to at least a portion of a field-of-view, comprising:

utilizing one or more sensors of a first vehicle to obtain and provide data, the data including data indicating at least a second vehicle;

determining illumination for at least a first subsection including the second vehicle and at least one or more second subsections, to either side of the first subsection, including determining an illumination level for the first subsection that substantially illuminates the first subsection below a predefined illuminance, and determining an illumination level for the one or more second subsections that substantially illuminates the one or more second subsections above the predefined illuminance;

determining control instructions for controlling one or more directional light sources included in the adaptive headlight system to achieve the determined illumination levels for at least the first and one or more second subsections; and

controlling the light sources to emit the headlight beam in accordance with the control instructions.

D. Asserted Grounds of Unpatentability

The Petition raises the following grounds:

Claims Challenged	Basis	References
37–44, 47, 50–56, 58, 59, 60–62, 64, 65, 70	§ 102	Alden, ² Stam ³
37–44, 47, 50–56, 58, 59, 60–62, 64, 65, 70	§ 103	Alden, Stam
45, 68, 69	§ 103	Alden, Stam, Harbers ⁴
46	§ 103	Alden, Stam, Bergkvist ⁵
48, 57, 63	§ 103	Alden, Stam, Beam ⁶
49	§ 103	Alden, Stam, Kobayashi ⁷
66, 67	§ 103	Alden, Stam, Braun ⁸

Petitioner also relies on a Declaration of Dr. Nikolaos Papanikolopoulos, filed as Exhibit 1003. Patent Owner relies on a Declaration of Matthew A. Turk, Ph.D., filed as Exhibit 2001.

² U.S. Patent App. Pub. No. 2003/0137849 A1 (Exhibit 1005).

³ PCT Patent App. Pub. No. WO 01/70538 A2 (Exhibit 1010).

⁴ PCT Patent App. Pub. No. WO 01/01038 (Exhibit 1006).

⁵ U.S. Patent No. 4,970,628 (Exhibit 1007).

⁶ U.S. Patent No. 6,144,158 (Exhibit 1008).

⁷ U.S. Patent No. 6,049,749 (Exhibit 1009).

⁸ PCT Patent App. Pub. No. WO 02/04247 A1 (Exhibit 1011).

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

Petitioner contends that a person of ordinary skill in the art at the time of the alleged invention “would have had an undergraduate degree in mechanical engineering, electrical engineering, automotive engineering, optical engineering, applied physics, computer science, or similar disciplines, along with two years of experience working with intelligent vehicle systems, automotive control systems, or lighting control systems” and that more education could compensate for less experience and vice versa. *See* Pet. 8–9 (citing Ex. 1003 ¶ 33).

Patent Owner “does not dispute Petitioner’s proposed skill level for a person of ordinary skill in the art” (Prelim. Resp. 7), and, as we generally agree that it is consistent with the subject matter disclosed in the ’503 patent and the prior art, we adopt it for purposes of this decision.

B. *Claim Construction*

We construe claims using the standard that would be applied in a civil action under 35 U.S.C. § 282(b), giving terms their ordinary and customary meaning to one of ordinary skill in the art in view of the specification and prosecution history. *See* 37 C.F.R. § 42.100(b).

Petitioner does not seek construction of any claim terms and asserts that “all claim terms [discussed in the Petition] are given [their] ordinary and customary meaning.” Petition 8. Patent Owner asserts that “[n]o claim construction is necessary” at this time because its “arguments for denial do not hinge on the outcome of an actual controversy about claim interpretation.” Prelim. Resp. 7.

There being no present dispute about the meaning of any claim term, we find that no express claim construction is necessary to resolve the issues

addressed in this decision. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (explaining that construction is needed only for terms that are in dispute, and only as necessary to resolve the controversy).

C. Patentability Analysis

1. Anticipation and Obviousness in View of Alden Alone

Petitioner argues that independent claims 37, 59, and 65, as well as dependent claims 38–44, 47, 50–56, 58, 60–62, 64, and 70, were anticipated by Alden. *See* Pet. 9–53.

We agree with Petitioner that Alden discloses much of the subject matter of the challenged independent claims. Specifically, Alden describes headlamps with pluralities of light clusters fixed to a vehicle. *See, e.g.*, Ex. 1005, Figs. 1, 2, 3, 5. There are sensors that obtain sensor data indicating a second vehicle within the field-of-view. *See id.* ¶¶ 25–29, Fig. 3. The reference further describes a processor that receives the sensor data and illuminates a portion of the field-of-view including another vehicle at one illuminance and another portion of a field-of-view at a higher illuminance. *See id.* ¶¶ 26–28. Alden also discloses, in Figure 5 for example, that each headlamp may include three directional light sources aimed at different angles relative to the vehicle, as recited in claim 59.

Regarding the claimed “predefined threshold value” or “predefined illuminance,” Petitioner asserts that “Alden’s system can ‘provide illumination to independently controlled segments [e.g., ‘subsections’] each operable within a range of intensities between the high and the low beam state” and that Alden’s “intensities in between high beam and low beam (e.g., medium) are the claimed ‘predefined threshold value’ which the low beam would be below and the high beam would be above.” Pet. 25. We tend to

disagree with this analysis, as it does not appear that a “range of intensities” is a “predefined threshold value” or “predefined illuminance,” if those terms are given their ordinary meaning. We thus conclude that, on this record at least, Petitioner has not shown a reasonable likelihood that Alden anticipates these claims.

Regarding obviousness in view of Alden alone, Patent Owner argues that Petitioner has “failed to establish or demonstrate multiple elements that are required to support an obviousness conclusion, including explaining how Alden must be modified (i.e., identifying the differences between the claimed invention and Alden) and explaining why a POSA would be motivated to so modify Alden (i.e., providing some articulated reasoning with some rational underpinning to support an obviousness conclusion).” Prelim. Resp. 37. We agree. It does not appear that Petitioner has provided any basis on which to account for differences between Alden and the challenged claims based on Alden’s disclosures alone.

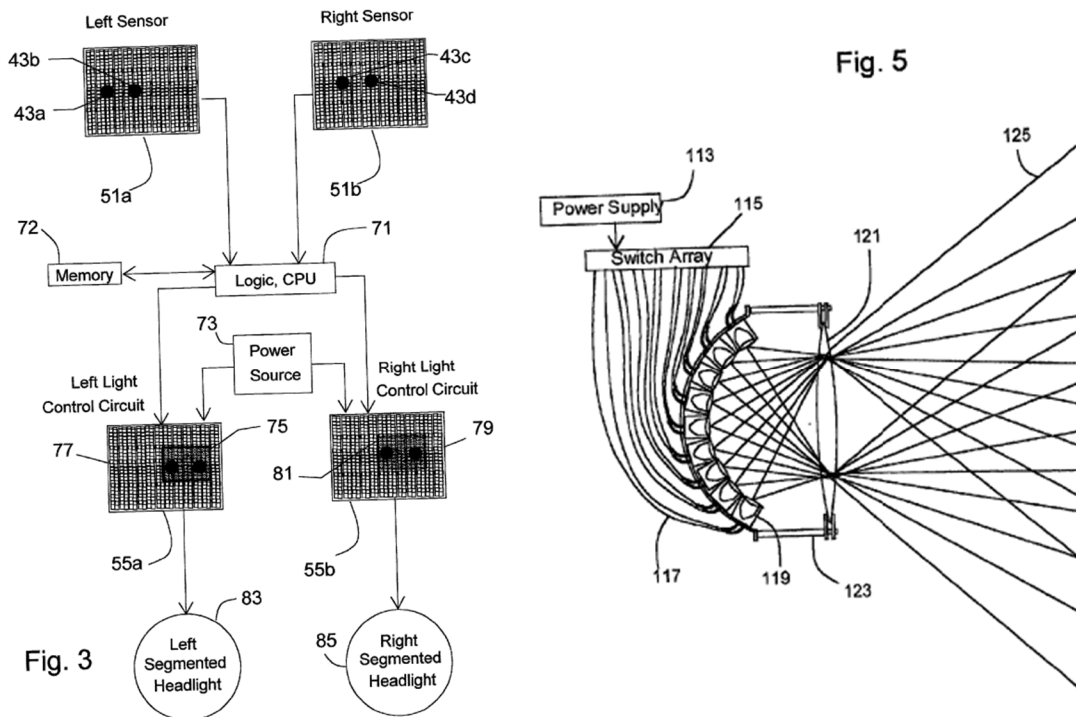
2. *Obviousness in View Alden and Stam*

Petitioner alternatively asserts that claims 37, 59, and 65, as well as dependent claims 38–44, 47, 50–56, 58, 60–62, 64, and 70, would have been obvious in view of Alden and Stam, as Stam’s similar system discloses use of a threshold value and, argues Petitioner, it would have been obvious to use such a threshold value in Alden as an “easy, known way to ensure the appropriate light levels . . . are being used at all times.” See Pet. 26–27.

Patent Owner does not dispute Petitioner’s argument with respect to the addition of Stam, but does offer several other arguments as to why Petitioner has not established obviousness in view of Alden and Stam.

First, Patent Owner asserts that Alden is “fatally ambiguous” and “fails to provide an enabling disclosure” because it describes the use of two-

dimensional sensors and switch arrays (as shown in Figure 3, below left), but the headlamp embodiment on which Petitioner relies (which is depicted in Figure 5, excerpted below right), has just single line of LEDs. *See* Prelim. Resp. 19–23.



Alden's Figures 3 and 5

We find this argument unpersuasive because we conclude, on the present record, that one of ordinary skill in the art (*see* Section II.A), would understand that Figure 5 is a schematic/sectional type of drawing intended to show generally how the system components are connected and how the LEDs would project light through the lens, and that for clarity it omits other LEDs that would be necessary to produce a two-dimensional lighting pattern. We conclude that the skilled artisan would recognize that a headlamp intended to produce a pattern similar to that reflected in the control circuits of Figure 3 would include additional rows of LEDs passing through the center of the lens

at different angles arranged around the center of the lens. Alternatively, we conclude that one of ordinary skill in the art wishing to use a headlamp with just a single line of LEDs, as in Figure 5, would understand that the sensor and/or control circuitry would need to be tailored to such an arrangement.

Second, in a footnote, Patent Owner argues that “Alden also does not disclose clearly and unambiguously, nor describe with any precision or detail, the propagation of beam segments produced by headlight 123 beyond the endpoints illustrated in Figure 5.” Prelim. Resp. 22 n.3. Patent Owner asserts that “the beam segments of each LED element 119 exiting the lens 121 are illustrated in Figure 5 as collimated and propagating with a columnar shape, which would be unchanged with increasing distance from headlight 123.” *Id.* According to Patent Owner, “it is completely unclear how an oncoming vehicle at a properly scaled distance from headlight 123 (i.e., well beyond the beam segment endpoints illustrated in Figure 5) would be illuminated by the equipped vehicle headlight, particularly in view of the statement in Alden that the intensity of light (high-beam/low-beam) produced by the equipped vehicle headlight is determined by the distance between the equipped vehicle and the oncoming vehicle.” *Id.*

To the extent it is understood, this argument is unpersuasive. Alden’s Figure 5 shows the light produced by a given source projected from the lens with a fifteen-degree spread. *See* Ex. 1001, Fig. 5 (“15 degrees per segment”). An oncoming vehicle within that spread would be illuminated by that light source once the vehicle was within the range of the projected light. To the extent Patent Owner is suggesting that Figure 5 is intended to show that the range of the light is limited to the length of the illustrated segments, we find that to be incorrect. It is clear at least from the scale of the line

segments relative to the size of the headlamp that the segments indicate only the direction and spread of the light, not its range.

Patent Owner next takes issue with Petitioner's annotated version of Alden's Figure 5, asserting that while it "purports to show how headlight 123 operates in a specific scenario . . . none of the operations purportedly shown by these annotations of Figure 5 are expressly disclosed in Alden." Prelim. Resp. 24. We disagree. The coloring added by Petitioner is supported in Alden, as it describes, in connection with Figure 5, how "the [emitted light] 125 from [light element] 119 falls across a 15 degree section of the headlight distribution area," that "[e]ach other lighting element similarly falls within a defined area of the light distribution area," and that "*the light sent to the area of [light emitting vehicle] 41 is dimmed using a headlight with segmented lighting means.*" Ex. 1005 ¶ 29 (emphasis added). This corresponds to dimming the light in the direction of the "sensed vehicle," as depicted in Petitioner's annotated Figure.

Patent Owner next argues that "in its annotations, Petitioner has clearly rendered the sensed oncoming vehicle shown using a completely inaccurate scale, with the width of that vehicle being less than that of the headlight 123" and that "[p]roperly scaled given the size of headlight 123, the sensed vehicle located at the distance shown in Petitioner's annotated version of Figure 5 would have a width that spans all the beam segments illuminating the distribution area" and that "this means . . . all the light LED elements 119 would be dimmed to produce low beam illumination," thus not meeting the claim language. Prelim. Resp. 24–35. This too is unpersuasive. While it may be true that a full-sized vehicle positioned a few feet in front of the

headlight would cause it to be fully dimmed, that same vehicle would cause partial dimming when located further away, as claimed.

Finally, Patent Owner argues that “to the extent Petitioner’s contentions of anticipation are based on picking, choosing, and/or combining various features of Alden’s different headlight system embodiments not directly related to each other, those contentions fail because any resulting headlight would be inoperative.” Prelim. Resp. 23.

With respect to most of the challenged claims, this argument is unpersuasive because Patent Owner does not explain how or why Petitioner’s contentions are based on combining disparate features of different embodiments, and it is not evident from our review of the Petition how that might be the case. For the most part, Petitioner is relying on the control system shown in Figure 3, using a headlight that is the multiple LED embodiment shown in Figure 5. Those are different parts of a single disclosed system, not different embodiments.

We do note that Petitioner alternatively relies on the embodiment shown in Alden’s Figure 10 for the “light modifying elements” of claims 42–44. *See* Pet. 41–71. Claim 42 recites “one or more light modifying elements provided in the path of light emitted from . . . the sources,” and claim 44 recites that the light modifying element may comprise, among other things, lenses. We agree with Petitioner that, as shown in Figure 5, for example, Alden discloses the use of lenses in the path of the light. It thus appears that Petitioner may not need to rely on Figure 10 for claims 2 and 4.

Claim 43 recites that “at least one of the . . . processors is configured to instruct control of at least one light modifying element.” For that, Petitioner cites the embodiment shown in Alden’s Figure 10. However, the Figure 10 embodiment uses a single light source instead of the multiple LEDs of the Figure 5 embodiment, and it is not clear on the current record how or why one might use Figure 10’s variable refractive elements in a headlight like that of Figure 5, where the light direction and intensity are already controlled by varying the power to the individually angled LEDs. Nor is it clear how it would be beneficial to alter the direction of the light using light modifying elements in a system that uses a bi-convex lens as in Figure 3. Nor is it clear how Figure 10’s variable refractive elements might be used where, as in Figure 5, the light rays are not collimated. The parties may wish to address those issues during the trial.

Because we find that Alden and Stam disclose all of the elements of the independent claims, and that Petitioner has provided a sufficient motivation to combine, we determine that Petitioner has established a reasonable likelihood of proving them obvious in view of Alden and Stam. We have also reviewed Petitioner’s contentions for dependent claims 38–44, 47, 50–56, 58, 60–62, 64, and 70, which Patent Owner does not separately argue at this stage, and conclude (with the possible exception of claim 43, as discussed above), that Petitioner has established a reasonable likelihood of proving them obvious in view of Alden and Stam.

3. Obviousness Grounds with Additional References

Petitioner adds Harbers to Alden and Stam for claims 5, 28, and 29 (different colors of light), Bergkvist for claim 6 (infra-red or ultra-violet light), Beam for claims 8, 18, and 24 (preceding vehicles in claim 8; laser

diodes in claims 18 and 24), Kobayashi for claim 9 (GPS sensor), and Braun for claims 66–67 (pedestrian or road sign). *See* Pet. 53–74.

Patent Owner does not presently offer separate arguments for the grounds based on the combination of Alden/Stam and Harbers, Bergkvist, Beam, Kobayashi, or Beam, and we find, based on the current record, that Petitioner has established a reasonable likelihood of proving them obvious in view of the respective combinations.

D. Procedural Arguments

Patent Owner contends that the Petition lacks particularity under 35 U.S.C. § 312(a)(3) because it improperly combines anticipation and obviousness grounds based on Alden alone. *See* Prelim. Resp. 40–44. We do not agree that the Petition’s approach presents a problem or is hard to understand. As discussed above, we agree with Patent Owner that Petitioner has not adequately supported its obviousness contention based on Alden alone, but that does not undermine the anticipation ground or make it difficult to comprehend. Accordingly, we do not agree with Patent Owner that the Petition should be denied for lack of particularity.

III. CONCLUSION

We determine that Petitioner has established a reasonable likelihood of proving that at least one claim of the ’503 patent is unpatentable over the cited prior art and that it would not be appropriate to deny institution on procedural grounds. We accordingly institute an *inter partes* review.

IV. ORDER

For the reasons given, it is:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is instituted on all challenged claims with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(a), *inter partes* review of the '503 patent is instituted commencing on the entry date of this Order, and, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is given of the institution of a trial.

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