

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLKSWAGEN GROUP OF AMERICA, INC.,
Petitioner

v.

YECHEZKAL EVAN SPERO,
Patent Owner.

IPR2023-00328
Patent 10,894,503 B2

Before JON M. JURGOVAN, JASON W. MELVIN, and
AARON W. MOORE, *Administrative Patent Judges*.

MOORE, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background*

Volkswagen Group of America, Inc. (“Petitioner”) filed a Petition requesting *inter partes* review of claims 26–36 and 65–70 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 7 (“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*

The parties identify two civil actions, *Torchlight Techs. LLC v. Daimler AG et al.*, No. 1:22-cv-00751 (D. Del.), and *Torchlight Techs. LLC v. General Motors LLC et al.*, No. 1:22-cv-00752 (D. Del.), both of which are pending, as related matters. *See* Pet. 144, Paper 5, 1.

The parties also identify two other petitions for *inter partes* review of the ’503 patent, IPR2023-00197, which we instituted on June 21, 2023, and IPR2023-0335, which we also institute today. *See* Pet. 155, Paper 5, 1.

Petitioner additionally identifies U.S. Patent Nos. 9,955,551, 8,100,552, and 11,208,029 as having issued from related applications, and Patent Owner additionally identifies several other Patent Office proceedings concerning related patents. *See* Pet. 145; Paper 5, 2.

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. An embodiment that corresponds to the challenged claims is depicted in Figure 15, reproduced in part below:

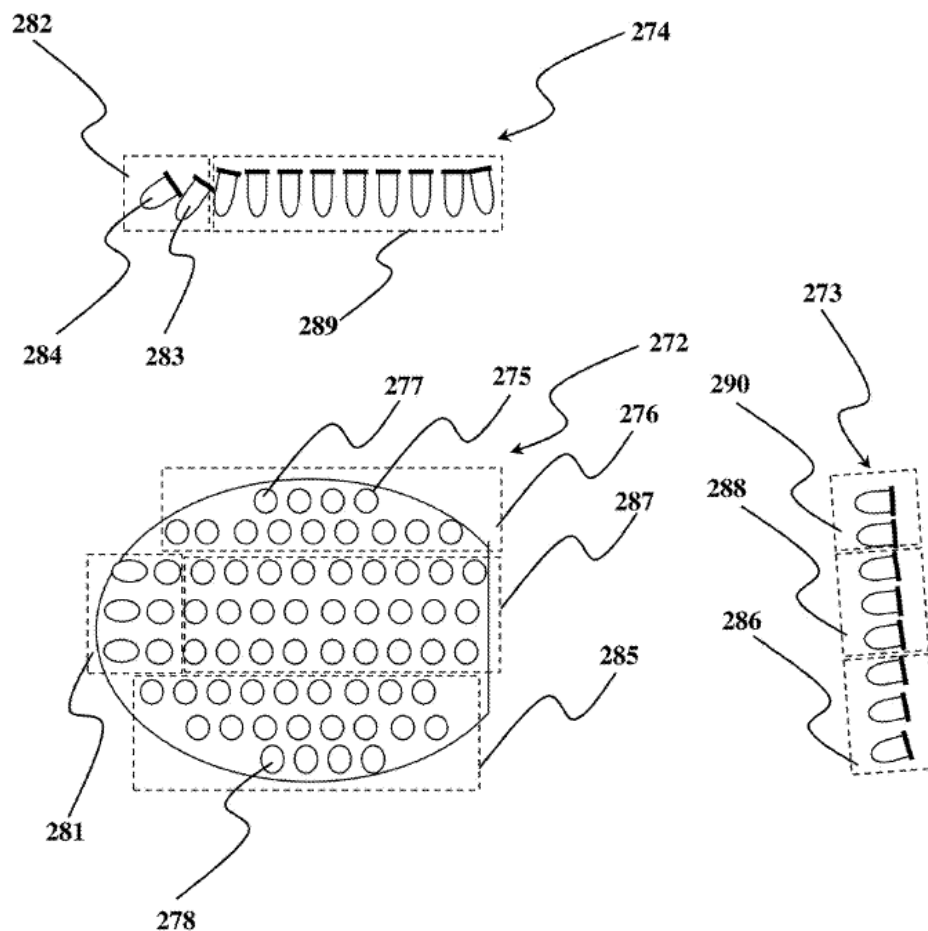


Figure 15 shows a “multiple light-source headlamp.” Ex. 1001, 15:64.

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 53:29–32.

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 [Solid-State Light Sources] 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.

The patent further explains that “[a] possible control system” is described in U.S. Patent No. 6,281,632, issued to Stam et al., which “discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle [that] includes an imaging system capable of determining lateral and elevational locations of headlamps lamps from oncoming vehicles and tail lamps from leading vehicles.” *Id.* at 52:31–46.

Claims 26 and 65 are independent and directed to methods for generating a headlight beam. They are reproduced in full below:

26. 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 vehicle including the adaptive headlight system to obtain and provide data predefined as

relevant to a determination of illumination requirements for the field-of-view, the data including data indicative of at least one of one or more other vehicles or a pedestrian;

determining illumination requirements for the field-of-view based on the data sensed by the sensors, including determining illumination for at least a first subsection of the field-of-view including the other vehicle or pedestrian, as indicated by the sensor data, and for at least a second subsection of the field-of-view not including the other vehicle or pedestrian;

determining a control strategy for controlling one or more directional light clusters in a headlight assembly to create an output headlight beam meeting the determined illumination requirements, the headlight beam spatial light distribution shaped to provide high beam illumination for a driver of the vehicle, in at least the second subsection, while mitigating glaring light illuminating at least the first subsection including detected other vehicles or pedestrians;

sending control signals implementing the control strategy to an electronic control circuitry configured to operate the light-clusters; and

controlling the light clusters via the electronic control circuitry to collectively emit the headlight beam meeting the determined illumination requirements.

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

Petitioner's challenge raises the following grounds:

Claims Challenged	Basis	References
26, 27, 30, 31	§ 103	Beam, ¹ Thominet ²
65	§ 103	Beam, Thominet, Stam ³
32–36	§ 103	Beam, Thominet, Kobayashi ⁴
70	§ 103	Beam, Thominet, Stam, Kobayashi
66, 67	§ 103	Beam, Thominet, Stam, Braun ⁵
28, 29	§ 103	Beam, Thominet, Harbers ⁶
68, 69	§ 103	Beam, Thominet, Stam, Harbers
26–31, 65, 68, 69	§ 103	Karlsson, ⁷ Harbers

¹ U.S. Patent No. 6,144,158 (Exhibit 1005).

² U.S. Patent App. Pub. No. 2001/0019486 A1 (Exhibit 1006).

³ PCT Patent App. Pub. No. WO 01/70538 A2 (Exhibit 1007).

⁴ U.S. Patent No. 6,049,749 (Exhibit 1008).

⁵ PCT Patent App. Pub. No. WO 02/04247 A1 (Exhibit 1009).

⁶ PCT Patent App. Pub. No. WO 01/01038 A1 (Exhibit 1011).

⁷ PCT Patent App. Pub. No. WO 98,54030 (Exhibit 1010).

32–36, 70	§ 103	Karlsson, Harbers, Gotou ⁸
66, 67	§ 103	Karlsson, Harbers, Braun

Petitioner also relies on Declaration of Jianzhong Jiao, Ph.D., filed as Exhibit 1003.

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 a bachelor’s degree (B.S.) in mechanical engineering, electrical engineering, optical engineering, applied physics, or an equivalent field, as well as at least 2 years of industry experience in the area of automotive lighting and lighting-control systems” and “may [have] work[ed] as part of a team, for example, with computer engineers to integrate, program, etc., controllers and various control inputs to affect control of a given light source.” Pet. 6 (citing Ex. 1003 ¶¶ 42–44).

Patent Owner asserts that a person of ordinary skill in the art “would have had a Master of Science Degree (or a similar technical Master Degree, or higher degree) in an academic area emphasizing electrical engineering, computer engineering, or computer science with experience or education in optics and imaging systems or, alternatively, a Bachelor’s Degree (or higher degree) in an academic area emphasizing electrical, computer engineering or computer science and having two or more years of experience in the field of optical and imaging systems.” Prelim. Resp. 9 (citing Ex. 2001 ¶¶ 31–33).

⁸ U.S. Patent No. 5,588,733 (Exhibit 1012).

For purposes of this decision, we adopt Petitioner’s proposal, which we find generally consistent with the disclosures of the ’503 patent, except that we omit the qualifier “at least” and set the level of experience at two years. Petitioner’s use of the qualifier “at least two years” introduces ambiguity and may encompass skill levels beyond ordinary. If Patent Owner believes that use of its proposal instead of Petitioner’s as modified would affect the analysis, that should be addressed during the trial.

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 discusses Patent Owner’s assertion, made during a reexamination of a different patent, that “light source” should mean “individual LED,” but asserts that “[t]he applied references . . . cover Patent Owner’s proposed construction.” *See* Pet. 6–7. Petitioner also observes that the ’503 specification states: “[a]s used herein, the term ‘light source’, LED or ‘solid state light source’ means any system that is capable of receiving an electrical signal and producing light in response to the signal.” *Id.* at 7 (quoting Ex. 1001, 17:7–10). Petitioner states that it “does not believe any other claim terms require specific construction and [that they] should receive their plain and ordinary meaning, in the context of the ’503 patent specification.” *Id.* at 8. For its part, Patent Owner asserts that “[n]o claim construction is necessary . . . because Patent Owner’s arguments for denial do not hinge on the outcome of an actual controversy about claim interpretation.” Prelim. Resp. 9.

We find that no express claim construction is necessary to resolve the institution question. *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

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious to a person having ordinary skill in the art to which said subject matter pertains. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations, including commercial success, long-felt but unsolved needs, failure of others, and unexpected results. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

1. The Primary References

Beam discloses a “method and apparatus for automatically reformatting the pattern of a beam from a light source to prevent it from illuminating certain areas in the vicinity of a light forward of it.” Ex. 1005, 1:5–8. Specifically, Beam describes “a headlight with an output comprising a multiplicity of microbeams projecting a composite beam of light in the forward direction,” where “the direction of an incoming beam of light impinging on the forward projecting headlight will be sensed by sensors controlling the individual microbeams to darken 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.” *Id.* at 1:9–18.

Karlsson similarly discloses a “lighting device [that] comprises a light-sensitive sensor, which detects the distribution and the intensity of light in the area ahead of a vehicle,” in which “[t]he pattern of the light beam being emitted by the lighting device is automatically and dynamically adapted in dependence on the intensity and the direction of the light being detected.” Ex. 1010, 2:2–6. The idea is that the “part of the light beam which might cause inconvenience to oncoming traffic is automatically suppressed, whilst retaining an optimum lighting effect for the driver of the vehicle himself.” *Id.* at 2:7–9. Karlsson’s specific improvement to that prior art system was to reduce “the possibly disturbing influence of the lighting device’s own lighting means on the sensor means . . . by decreasing the light intensity of the lighting means during the detection by the light sensor means, or . . . by even switching off the light altogether.” *Id.* at 3:8–12.

2. *Analysis*

For the grounds using Beam as a base reference, Petitioner argues that independent claim 26 and dependent claims 27, 30, and 31 would have been obvious in view of Beam and Thominet and that independent claim 65 would have been obvious in view of Beam, Thominet, and Stam. *See* Pet 8–38. Petitioner adds Kobayashi for dependent claims 32–36 and 70, Braun for dependent claims 66 and 67, and Harbers for dependent claims 28, 29, 68, and 69. *See id.* at 38–78.

For the grounds using Karlsson as a base reference, Petitioner argues that independent claims 26 and 65, and dependent claims 27, 30, and 31 would have been obvious in view of Karlsson and Harbers. *See* Pet 78–124.

Petitioner adds Gotou for dependent claims 32–36 and 70 and Braun for dependent claims 66 and 67. *See id.* at 125–141.

For the Beam grounds, Petitioner adds Thominet in the event Beam does not disclose “determining a control strategy for controlling one or more directional light clusters in a headlight assembly to create an output headlight beam meeting the determined illumination requirements.” *See* Pet. 30.

Petitioner asserts that “Thominet’s headlights include directional, independently controllable semiconductor light sources 10 (e.g., LEDs) arranged on curved surface 12 to provide beam regions 22, 24, 26, 28 (directional light clusters) for different functions.” *Id.* at 31. Petitioner adds Harbers to Karlsson for the same reasons. *See id.* at 78, 79.

We have reviewed Petitioner’s mapping of the claims to the references and agree that, on the record as it now stands, Petitioner has shown that claim 26 reads on Beam. As described above, Beam describes generating a headlight beam to illuminate a field-of-view, using a sensor to obtain data indicative of an oncoming vehicle, using the sensor data to determine illumination requirements for (i) a first subsection of the field-of-view that includes the vehicle and (ii) a second subsection of the field-of-view that does not include the vehicle, determining a strategy for controlling directional light clusters or sources to create a headlight beam meeting the illumination requirements and shaped to provide high beam illumination for a driver of the vehicle while mitigating glaring light illuminating towards the other vehicle, and sending signals to control the light clusters or sources emit the headlight beam meeting the illumination requirements.

Claim 65 is similar to claim 26 but requires that the illumination level for the first subsection (the one with the vehicle) is below a “predefined

illuminance” and that the illumination level for the second subsection (no vehicle) is above the predefined illuminance. For the predefined illuminance, Petitioner points to Beam’s “default illumination level” that is said to be “the equivalent of . . . low beams.” Pet. 39 (citing Ex. 1005, 6:30–33). Petitioner argues that, in Beam, the area in the first subsection (with the oncoming vehicle) is “significantly less than with current low beams” and that illumination in the second subsection is “at maximum intensity” and “like having bright high beams.” *Id.* (citing Ex. 1005, 6:30–33, 2:59–3:3, 6:11–12, 6:40–44, Figs. 1 & 1C–1D; Ex. 1003 ¶ 207). Patent Owner does not presently dispute this mapping and we agree, on this record at least, that Beam satisfies the predefined illuminance limitations.

We have also reviewed Petitioner’s mapping of the claims to Karlsson and agree that, on the record as it now stands, Petitioner has shown that claim 26 also reads on that reference. As described above, Karlsson similarly describes generating a headlight beam to illuminate a field-of-view, using a sensor to obtain data indicative of a vehicle, using the sensor data to determine illumination requirements for (i) a first subsection of the field-of-view that includes the vehicle and (ii) a second subsection of the field-of-view that does not include the vehicle, determining a strategy for controlling directional light clusters or sources to create a headlight beam meeting the illumination requirements and shaped to provide high beam illumination for a driver of the vehicle while mitigating glaring light illuminating towards the other vehicle, and sending signals to control the light clusters or sources emit the headlight beam meeting the illumination requirements.

For claim 65, Petitioner argues that the “predefined illuminance” is found in Karlsson’s “dipped” illuminance. *See* Pet. 109–115. This is similar

to how Petitioner used Beam’s “default illumination level.” Patent Owner does not presently dispute this mapping and we agree that, on this record at least, Karlsson satisfies the predefined illuminance limitations.

Patent Owner argues Beam and Karlsson do not disclose “controlling one or more directional light sources.” *See* Prelim. Resp. 41–44, 47–51. We do not agree, because both references clearly disclose light clusters or sources that produce directional light. *See, e.g.*, Ex. 1005, Figs. 4 & 6 (showing LEDs arranged to produce directional light); Ex. 1010, Fig. 1 (showing light source 2 projecting directional light). Unlike the claims addressed in IPR2023-00197, the claims at issue in this case do not require light sources that are arranged at different angles. Instead, they simply recite “directional light clusters” (claim 26) or “directional light sources” (claim 65), which, we conclude on the present record, is met in Beam and Karlsson.

We also find that, because the Beam and Karlsson meet the limitations for which Petitioner cites Thominet and Harbers, we need not reach Patent Owner’s arguments regarding the motivation to combine the primary and secondary references. *See* Prelim. Resp. 51–67.

Patent Owner also argues that “[i]n all Grounds, the combinations lack disclosure of systems that employ methods of determining illumination requirements: 1) *for at least a second subsection of the field-of-view not including the other vehicle or pedestrian*, per [26.5] and 2) *for at least one or more second subsections, to either side of the first subsection*, per [65.4].” Prelim. Resp. 30. According to Patent Owner, “[r]ather than providing evidence that the applied references determine illumination requirements for the sections that don’t include a vehicle and/or pedestrian, Petitioner simply

points to operating illumination states” and “[p]roviding light is . . . not the same as determining illumination requirements.” *Id.* at 31.

This is unpersuasive. Each base reference describes a system that uses a general illumination scheme (e.g., “full intensity” for Beam) and then uses sensors to identify light associated with oncoming vehicles and reduce the level of illumination in that direction. The systems thus “determine illumination” for the subsection that does not include the other vehicle (the general scheme) and for the subsection that does include the vehicle (the reduced level). The sensor data is used to determine the illumination requirement for the “second subsection” because it shows no oncoming vehicle in that subsection, allowing it to be illuminated to full intensity.

Because we find, on the current record, that Beam and Karlsson each disclose the elements of the independent claims, we determine that Petitioner has established a reasonable likelihood of proving that at least one claim is unpatentable over the cited prior art and institute *inter partes* review.

D. Procedural Arguments

Patent Owner argues that we should exercise our discretion to deny institution because “the Petition lacks particularity.” Prelim. Resp. 67.

Specifically, Patent Owner asserts that the Petition “adopts an extreme word count optimization strategy of hiding the claim limitations in a claim appendix.” Prelim. Resp. 67. We agree that Petitioner’s use of claim appendixes is cumbersome, but do not agree that it renders the Petition insufficiently particular.

Patent Owner also argues that, because Petitioner makes alternative arguments, it “does not identify with particularity ‘the *grounds* on which the challenge to each claim is based,’ and therefore should be denied institution under 35 U.S.C. § 312(a)(3).” Prelim. Resp. 71. We do not agree that

Petitioner's challenges lack particularity, because we understand the asserted combinations. Assertions that both references disclose a particular claim element do not undermine or overly cloud Petitioner's asserted combinations.

Patent Owner also argues that the three parallel petitions filed by Petitioner on the '503 patent are "redundant," that they "place a substantial and unnecessary burden on the Board and the patent owner [raising] fairness, timing, and efficiency concerns," and they "therefore should be denied under 35 U.S.C. §§ 316(b), 314." Prelim. Resp. 75. We do not agree, because we find the filing of three petitions justified in view of the large number of claims and the differences in claim scope.

III. CONCLUSION

We determine that Petitioner has established a reasonable likelihood of proving that at least one challenged 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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