

Spero's Demonstratives

Mercedes-Benz USA, LLC v. Yechezkal Evan Spero
IPR2023-01039 & IPR2023-01040 | U.S. 9,955,551 C1
IPR2023-01034 | U.S. Patent No. 11,208,029 B2
Consolidated Oral Hearing October 23, 2024

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Grounds – 1039 IPR

Petition:

V. **PRECISE RELIEF REQUESTED**

The relief requested is cancellation of the challenged claims, as follows:

Ground	References	Claims ²	Basis
1	Alden	24-27, 29-31, 32-35, 37-39, 40-43, 45-47	102 / 103
2	Alden / Kobayashi	28, 36, 44	103
3	Alden / Kondo	8, 10-14	103
4	Alden / Kondo / Stam	15-18	103

1039 Pet., 4-5

Institution Decision:

Petitioner presents its first ground as asserting “Alden Anticipates and Renders Obvious Claims 24–27, 29–35, 37–43, 45–47.” Pet. 11. As reflected in our description of asserted grounds above, we consider obviousness over Alden a separate ground from anticipation. *See supra* at 7 (§ I.E). Patent Owner submits that Petitioner fails to explain its obviousness contentions based on Alden alone with any level of detail. Prelim. Resp. 34. 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 (as considered by a skilled artisan).

1039 DI, 17

Grounds – 1040 IPR

Petition:

V. PRECISE RELIEF REQUESTED

The relief requested is cancellation of the challenged claims, as follows:

Ground	References	Claims ²	Basis
1	Alden	48, 50-51, 53-55, 56-59, 61-63, 64-67, 69-71, 72-75, 77-79, 80-83, 85-87	102/103
2	Alden / Beam	49	103
3	Alden / Kobayashi	52, 60, 68, 76, 84	103

1040 Pet., 4-5

Institution Decision:

Petitioner presents its first ground as asserting “Alden Anticipates and Renders Obvious Claims 48, 50–51, 53–59, 61–67, 69–75, 77–83, and 85–87.” Pet. 11. As reflected in our description of asserted grounds above, we consider obviousness over Alden a separate ground from anticipation. *See supra* at 6 (§ I.E). Patent Owner submits that Petitioner fails to explain its obviousness contentions based on Alden alone with any level of detail. Prelim. Resp. 28. 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 (as considered by a skilled artisan).

1040 DI, 19-20

Grounds – 1034 IPR

Petition:

V. PRECISE RELIEF REQUESTED

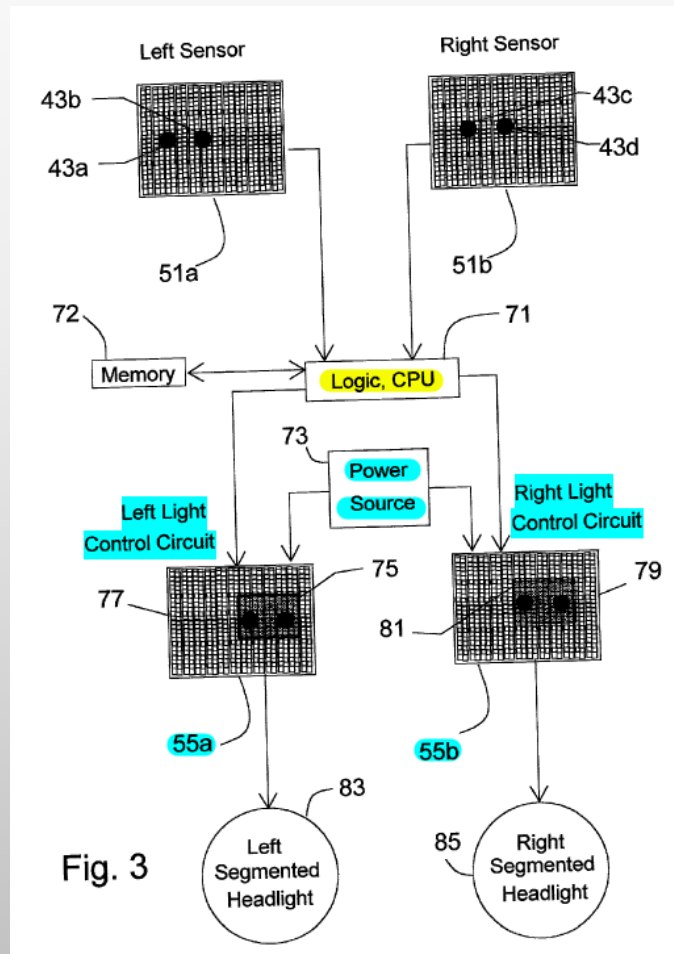
The relief requested is cancellation of the challenged claims, as follows:

Ground	References	Claims ²	Basis
1	Alden in view of Kobayashi	1-8, 10-11, 12-19, 21-22, 23-30, 32-33	103
2	Alden in view of Kobayashi (alone or alternatively in view of Beam)	9, 20, 31	103

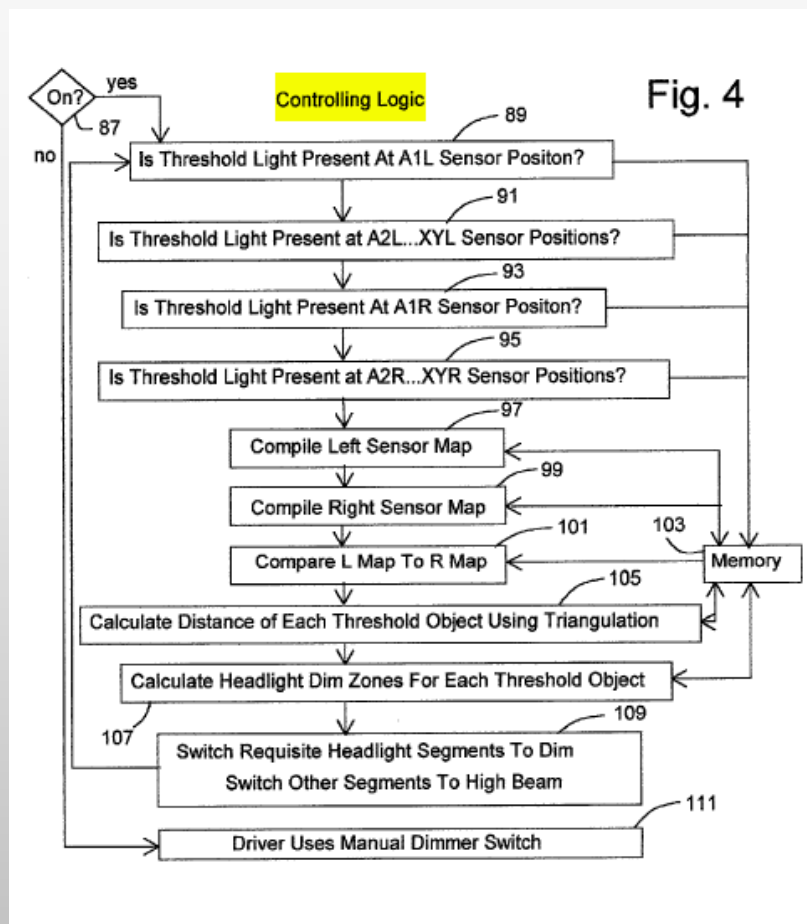
1034 Pet., 5

Overview of Alden

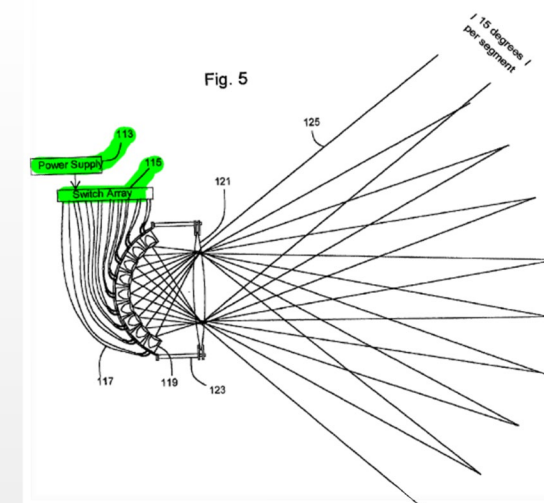
Alden



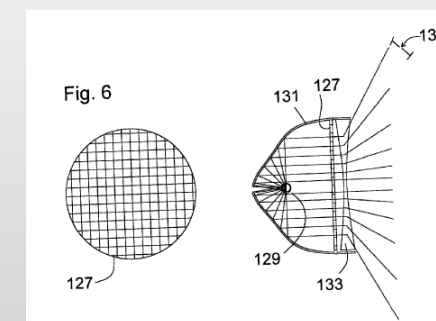
Ex. 1005, Fig. 3



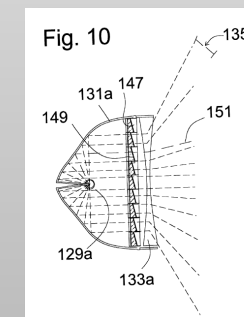
Ex. 1005, Fig. 4



Ex. 1005, Fig. 5



Ex. 1005, Fig. 6



Ex. 1005, Fig. 10

Alden

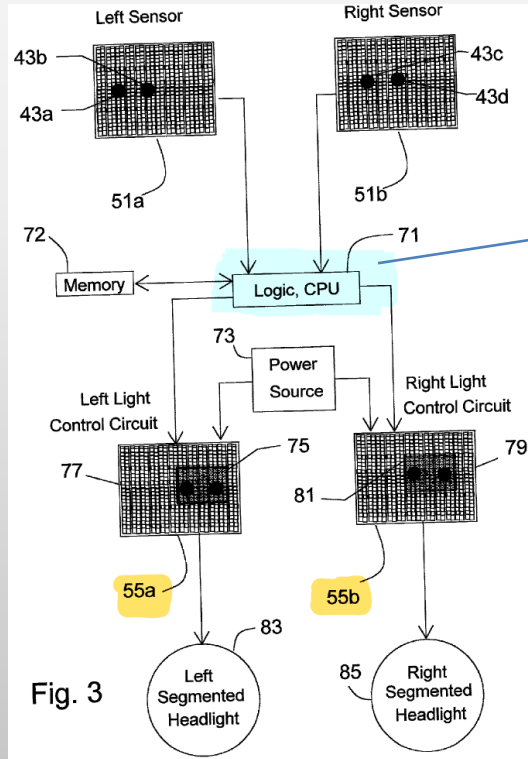
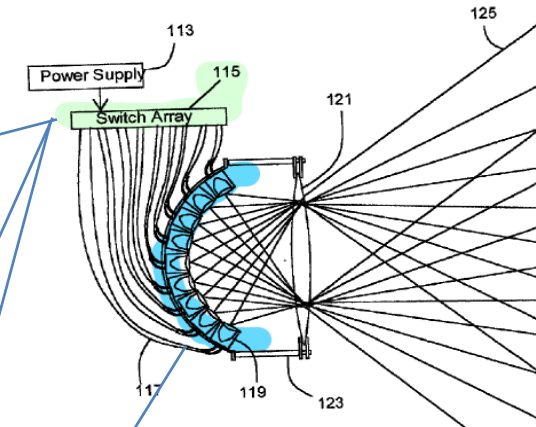


Fig. 3

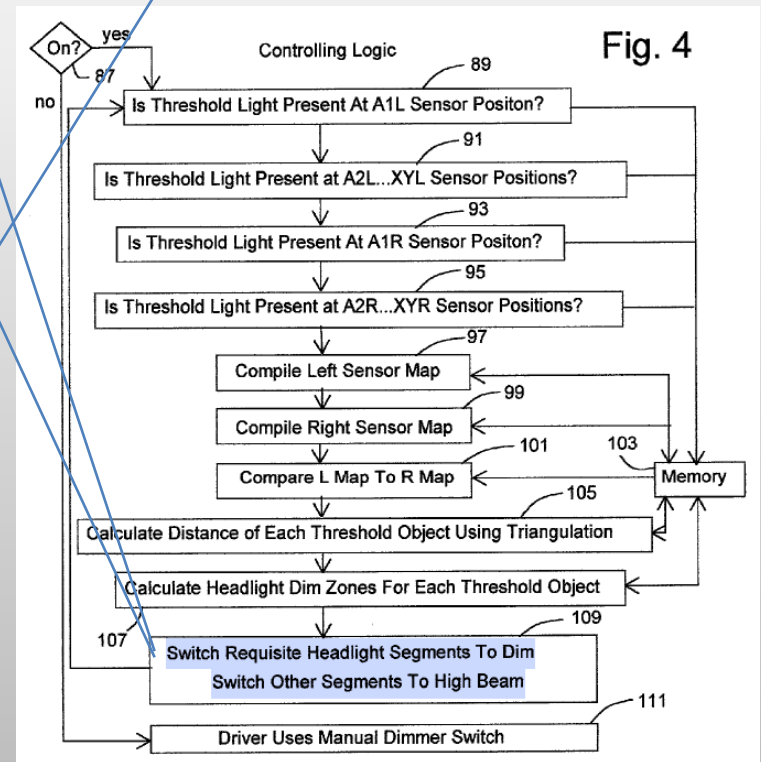
Ex. 1005, Fig. 3
(Annotated)

[0047] FIG. 5 illustrates the segmented headlight means and controlling switch array in a first embodiment. The head light is comprised of an array of individual lighting elements similar to light element 119. The light elements being part of a segmented head light 123. The 119 can be a white LED. Each lighting element being independently controlled by a corresponding switch in an array of switches 115. Each switch is controlled by the CPU and logic previously described. For example the power to 119 is controlled by the CPU which dictates its respective switch characteristics at 115 such that the power from a power supply 113 carried via segment wire 117 is controlled in response to the sensed environmental conditions. All of the other light elements are similarly individually controlled. The 119 and other lighting elements are on a curve along the focal point of a headlight lens 121 such that the light from each lighting element goes into a specified portion (or portions) of the headlight distribution area. Element emitted light 125 being an example of an element's light being directed into one sector of the light distribution area. In the illustration, the 125 from 119 falls across a 15 degree section of the headlight distribution area.

Ex. 1005, ¶[0047]



Ex. 1005, Fig. 5
(Annotated)



Ex. 1005, Fig. 4 (Annotated)

Boundaries of Anticipation

Anticipation

Teaching **cannot** be **ambiguous**:

1120 (Fed. Cir. 2002). For this reason, ambiguous references do not anticipate a claim. *See, e.g., W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554 (Fed. Cir. 1983) (refusing to find claims anticipated when the prior art references were “unacceptably vague”); *see also In re Hughes*, 345 F.2d 184, 188 (CCPA 1965); *In re Turlay*, 304 F.2d 893, 899 (CCPA 1962) (“**It is well established that an anticipation rejection cannot be predicated on an ambiguous reference.**”).

1039 POR, 29; *see also* 1040 POR, 22-23

1039 POR, 28; *see also* 1040 POR, 21-22

Relied-upon embodiment cannot be **inoperative**

1192 (Fed. Cir. 2008)). In that regard, **a prior art reference does not anticipate if it must be modified** to meet a challenged claim limitation. *Apple Inc. v. Corephotonics, Ltd.*, 861 F. App’x 443, 450 (Fed. Cir. 2021); *see also, Enplas Display Device Corp.* “**inoperative embodiments cannot be anticipatory.**” *See In re Dowty*, 118 F.2d 363, 366 (CCPA 1941) (“[A]n inoperative prior art device may not be relied upon as an anticipation.”) (*quoting In re Kehl*, 101 F.2d 193, 195 (CCPA 1939)); *see also* 1039 POR, 26; *see also* 1040 POR, 19-20

Clear and **unequivocal disclosure**

Further, “it is **not enough that the prior art reference . . . includes multiple, distinct teachings that [an ordinary] artisan might somehow combine** to achieve the claimed invention.” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008). Instead, **the reference must “clearly and unequivocally disclose the claimed [invention] or direct those skilled in the art to the [invention] without any need for picking, choosing, and combining various disclosures** not directly related to each other by the teachings of the cited reference.” *Id.* (*quoting In re Arkley*, 455

Anticipation – a POSA cannot “fill in” missing limitations

The prior art must be viewed as it is written and as it would be understood by persons in the field of the invention—not as it might have been written to describe a different development. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 851 F.3d 1270, 1274-75 (Fed. Cir. 2017) (This court’s precedent “does not permit the Board to fill in missing limitations” even **if** “a skilled artisan would immediately envision them.”) (citation omitted).

1039 Sur-Reply, 10; see also 1040 Sur-Reply, 5;
1034 Sur-Reply, 17

Failure of Proof: Impermissible Evolution

Overview

Ambiguity:

Given the lack of a clear disclosure and key gaps in how the hypothetical structure would be put together and then operate, **at best Petitioner identifies ambiguities as to how Figure 5 should be interpreted**—which establish that Petitioner has failed to meet its burden of proof. *See Wasica Fin. GmbH v. Cont'l Auto Sys., Inc.*, 853 F.3d 1039 Sur-Reply, 10; *see also* 1040 Sur-Reply, 5; 1034 Sur-Reply, 17

Non-functional Embodiment:

to create the beam spread illustrated therein. (Ex.2041, 108:11-109:5.) **Petitioner shows a control circuit for a two dimensional array, but does not explain how this can be applied the one-dimensional array of Figure 5 without impermissible modification of Figure 5 – and as noted before, Petitioner's expert cannot even explain what such an array would look like. (Petition, 42; Ex.2041, 108:14-109:5.)**

1039 POR, 41; *see also* 1040 POR, 35

Teaching **cannot** be **ambiguous**:

1120 (Fed. Cir. 2002). For this reason, ambiguous references do not anticipate a claim. *See, e.g., W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554 (Fed. Cir. 1983) (refusing to find claims anticipated when the prior art references were “unacceptably vague”); *see also In re Hughes*, 345 F.2d 184, 188 (CCPA 1965); *In re Turlay*, 304 F.2d 893, 899 (CCPA 1962) (“**It is well established that an anticipation rejection cannot be predicated on an ambiguous reference.**”).

1039 POR, 29; 1040 POR, 22-23

Relied-upon embodiment cannot be **inoperative**

1192 (Fed. Cir. 2008)). In that regard, **a prior art reference does not anticipate if it must be modified** to meet a challenged claim limitation. *Apple Inc. v. Corephotonics, Ltd.*, 861 F. App'x 443, 450 (Fed. Cir. 2021); *see also, Enplas Display Device Corp.* “**inoperative embodiments cannot be anticipatory.**” *See In re Dowty*, 118 F.2d 363, 366 (CCPA 1941) (“[A]n inoperative prior art device may not be relied upon as an anticipation.”) (*quoting In re Kehl*, 101 F.2d 193, 195 (CCPA 1939)); *see also*

1039 POR, 26; *see also* 1040 POR, 19-20

Petitioner Cannot Modify its Theory of Proof

Additionally, Petitioner has not specifically argued that Figure 5 of Alden shows a single row of a two-dimensional LED, let alone offered any supporting evidence or explanation. Petitioner is “master of its complaint” (*SAS Institute, Inc v. Iancu*, 138 S. Ct. 1348, 1355 (2018)) and, as a result, any attempt by Petitioner to now address this failing of its anticipation contention based on Alden, such as by offering a belated argument of obviousness, would be impermissible new argument and should be excluded. *Colas Sols., Inc. v. Blacklidge Emulsions, Inc.*, 759 F. App’x

1039 POR, 34; see also 1040 POR, 36-37

Under such circumstances, the Board does not abuse its discretion in declining to consider such untimely theories. ... see also *Wasica Finance GmbH v. Continental Automotive Sys., Inc.*, 853 F.3d 1272, 1286 (Fed. Cir. 2017) (“Rather than explaining how its original petition was correct, Continental's subsequent arguments amount to an entirely new theory of prima facie obviousness absent from the petition. Shifting arguments in this fashion is foreclosed by statute, our precedent, and Board guidelines.”).

Colas Sols., Inc. v. Blacklidge Emulsions, Inc., 759 F. App’x 986, 991-92 (Fed. Cir. 2019).

Failure of Proof: Ambiguous Teachings

Petitioner's current position relies on an ambiguous teaching

Teaching **cannot** be **ambiguous**:

1120 (Fed. Cir. 2002). For this reason, ambiguous references do not anticipate a claim. *See, e.g., W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554 (Fed. Cir. 1983) (refusing to find claims anticipated when the prior art references were “unacceptably vague”); *see also In re Hughes*, 345 F.2d 184, 188 (CCPA 1965); *In re Turlay*, 304 F.2d 893, 899 (CCPA 1962) (“It is well established that an anticipation rejection cannot be predicated on an ambiguous reference.”).

1039 POR, 29; *see also* 1040 POR, 22-23

Petitioner's expert agrees

Alden is not clear

Petitioner's expert indicated that it is “*not clear*” and could not explain how the switch array shown in Figure 3 controls the LED array shown in Figure 5 to create the beam spread illustrated therein:

Q. Okay. So[,] does the figure 3 description affect the total beam spread of the figure 5 embodiment?

A. The figure 3 can inform. But, again, this is a **concept**. So[,] if you look at the number of rows on 77 and 79, it's not clear how many. Assuming that each element controls one LED, it's not clear and I cannot count here.

* * *

A. In figure 3. It's a reference as an array matrix. In other words, there are rows and columns. So here basically the disclosure is that each one of these controls one LED. And this is what the POSITA would understand at that time. So[,] **it doesn't give me any information how many rows, how many columns we have. It's a concept diagram. There are no dimensions, no scale.**

(Ex.2041, 108:11-18; 108:23-109:1-5, emphasis added.)

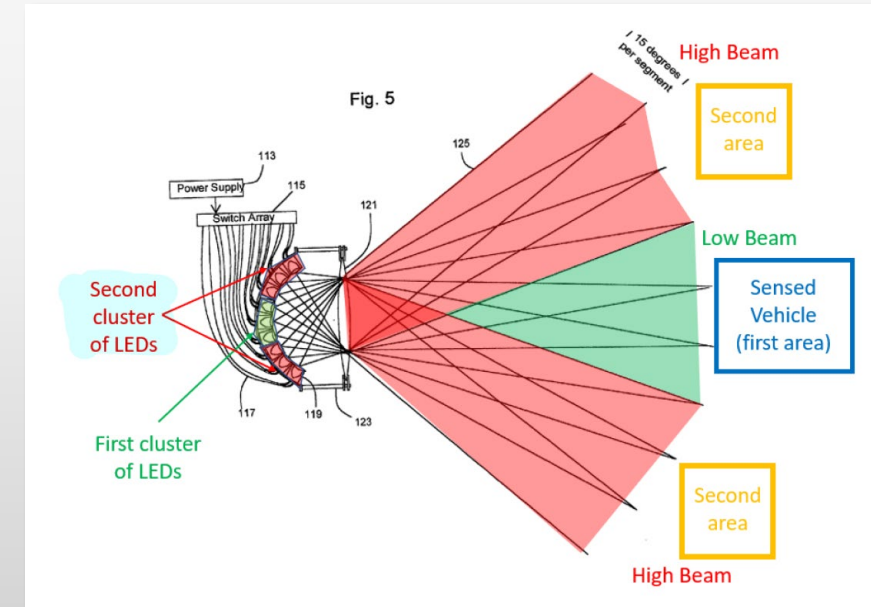
1039 POR, 32-33, 41; *see also* 1040 POR, 35; 1034 POR, 58-59

1D LED Array In the Petition

Petitioner:

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

1040 Reply, 13



1040 Pet., 38-39

Petitioner NOW argues that Alden “is not limited to” a 1D LED Array

Petitioner’s Reply:

Alden is clear that Figure 5 is *not* limited to a single row of LEDs. Nowhere does Alden call the LEDs a “row” or indicate they are “one dimensional,” as Patent Owner suggests. Instead, Alden discloses that Figure 5 illustrates “the segmented headlight” comprised of an “array” of lighting elements. (Alden, [0029], Fig. 5.) Figure 5 is simply a sectional view of one row of LEDs in this array. (DI, 15; Deposition Transcript of Dr. Nikos Papanikolopoulos (“Papanikolopoulos Depo.”) (EX2041), 57:22-58:4, 106:22-107:10, 110:7-19.)

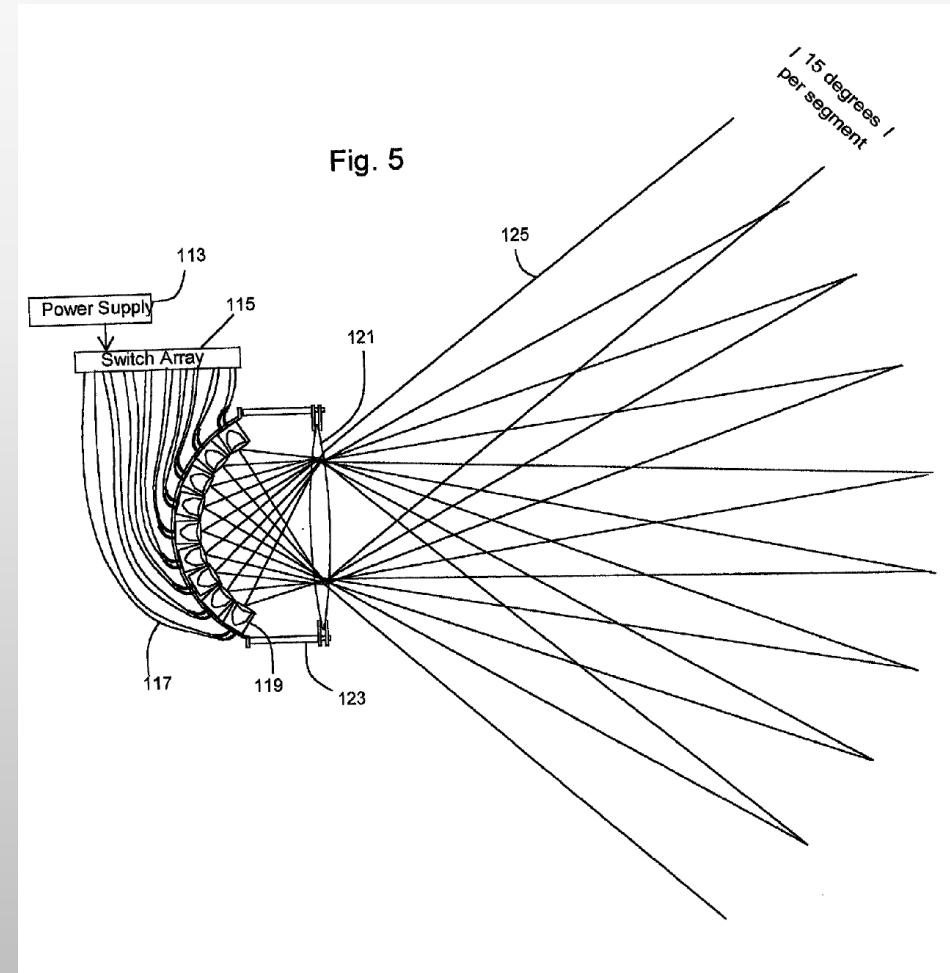
1040 Reply, 5; *see also* 1039 Reply, 5

¶[0029]/Fig. 5 of Alden – Shows/Discusses a 1D array

[0029] FIG. 5 illustrates the segmented headlight means and controlling switch array in a first embodiment. The headlight is comprised of an array of individual lighting elements similar to light element 119. The light elements being part of

a segmented head light 123. The 119 can be a white LED (or alternate lighting mechanism). Each lighting element being independently controlled by a corresponding switch in an array of switches 115. Each switch is controlled by the CPU and logic previously described. For example the power to 119 is controlled by the CPU which dictates its respective switch characteristics at 115 such that the power from a power supply 113 carried via segment wire 117 is controlled in response to the sensed environmental conditions. All of the other light elements are similarly individually controlled. The 119 and other lighting elements are on a curve along the focal point of a headlight lens 121 such that the light from each lighting element goes into a specified portion (or portions) of the headlight distribution area. Element emitted light 125 being an example of an element's light being directed into one sector of the light distribution area. In the illustration, the 125 from 119 falls across a 15 degree section of the headlight distribution area. Each other lighting element similarly falls within a defined area of the light distribution area. Thus the light sent to the area of 41 is dimmed using a headlight with segmented lighting means.

Ex. 1005,
¶[0029], Fig. 5



New evidence is evidence of ambiguity

Petitioner's New Evidence

understand Figure 5 to include multiple rows of LEDs. For example, Figures 6-7 both show (a) a “sectional” view of one row of lighting elements and (b) a “front-on” view depicting the full two-dimensional array of elements within the headlight.

1039 Reply, 5; *see also* 1040 Reply, 6

Owner suggests. Instead, Alden discloses that Figure 5 illustrates “the segmented headlight” comprised of an “array” of lighting elements. (Alden, [0029], Fig. 5.)

1039 Reply, 5; *see also* 1040 Reply, 5

Additionally, in discussing Figure 5, Alden explains that the “array” of LEDs is controlled by corresponding switches from a switch array using the “CPU and logic previously described.” (Alden, [0025].) As even Patent Owner’s expert admits,

1039 Reply, 6; *see also* 1040 Reply, 6

Problematic because

Given: 1) the differences between the one-dimensional array depicted in Figure 5 versus the two-dimensional arrays actually depicted in Figures 6 and 10;

1039 Sur-Reply, 9; *see also* 1040 Sur-Reply, 4

Petitioner’s remaining arguments are equally flawed. Petitioner points to Alden’s use of the term “array,” but fails to appreciate that an “array” can have a single row. Petitioner also contends that because the CPU logic of figure 4 has X/Y

1039 Sur-Reply, 5; *see also* 1040 Sur-Reply, 11

“[e]ach switch is controlled by the CPU and logic previously described.” (*Id.*)

Then Alden immediately gives an example of what this statement means – “for example, the power 119 is controlled by the CPU which dictates its respective switch characteristics such that. . . the power. . . is controlled . . . (*Id.*)

1039 Sur-Reply, 8; *see also* 1040 Sur-Reply, 3

Evidence of ambiguity continued

Petitioner's New Evidence

As a final example, Alden discloses additional functionalities its “segmented light distribution elements” can perform, including “directing light to look around corners,” “concentrat[ing] light to look uphill,” and “concentrat[ing] light to look downhill.” (Alden, Figs. 11-13, [0036]-[0038].) In these paragraphs, Alden discloses that it is the “segmented light distribution elements described herein” (which would include those of Figure 5) that can perform these functions, not just the lighting elements of any particular embodiment. (*Id.*) For Alden’s Figure 5 LEDs to direct

1039 Reply, 7-8; see also 1040 Reply, 6-7

Problematic because

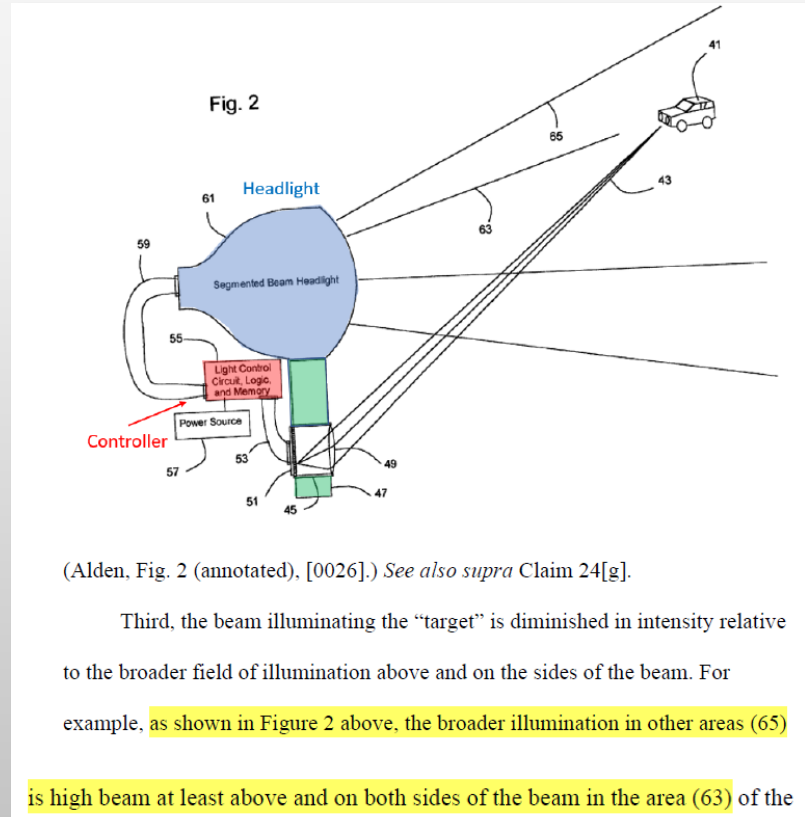
downhill.” (Reply, 7-8.) Alden does not show the elements of Figure 5 having the requisite “steering” capability and Petitioner does not explain how fixed, unsteerable LEDs can be used to “concentrate” light in any manner. Petitioner cannot simply rely on this statement as proof that Figure 5 has any more LEDs than it is actually shown to have, when such reliance would require at least an explanation of how a fixed array of unsteerable LEDs could “concentrate light.”

Petitioner also points to the boilerplate in [0061] as evidence that Figure 5 is able to “direct”/“concentrate” light —fairly read, those statements are limited to “segmented elements” in embodiments that can actually direct/concentrate light – a function never ascribed to Figure 5 by Alden nor proven by Petitioner. (Reply, 8.) Alden only expressly ascribes “steering” of light to the Figure 10 embodiment. (Ex.1005, ¶¶[0008], [0019].)

1039 Sur-Reply, 6; see also 1040 Sur-Reply, 12

Claims 32 / 48 and Figure 2 – Ambiguous Usage

1039 Petition:



1039 Pet., 41-42

1040 Petition:

[0027]-[0029]; see also [0025]-[0026], Figs. 1-2 (depicting common elevation, laterally-adjacent sectors of light with differing illumination based on whether another vehicle is present).)

1040 Pet., 36

1040 Reply:

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

1040 Reply, 13

Figure 2 is ambiguous

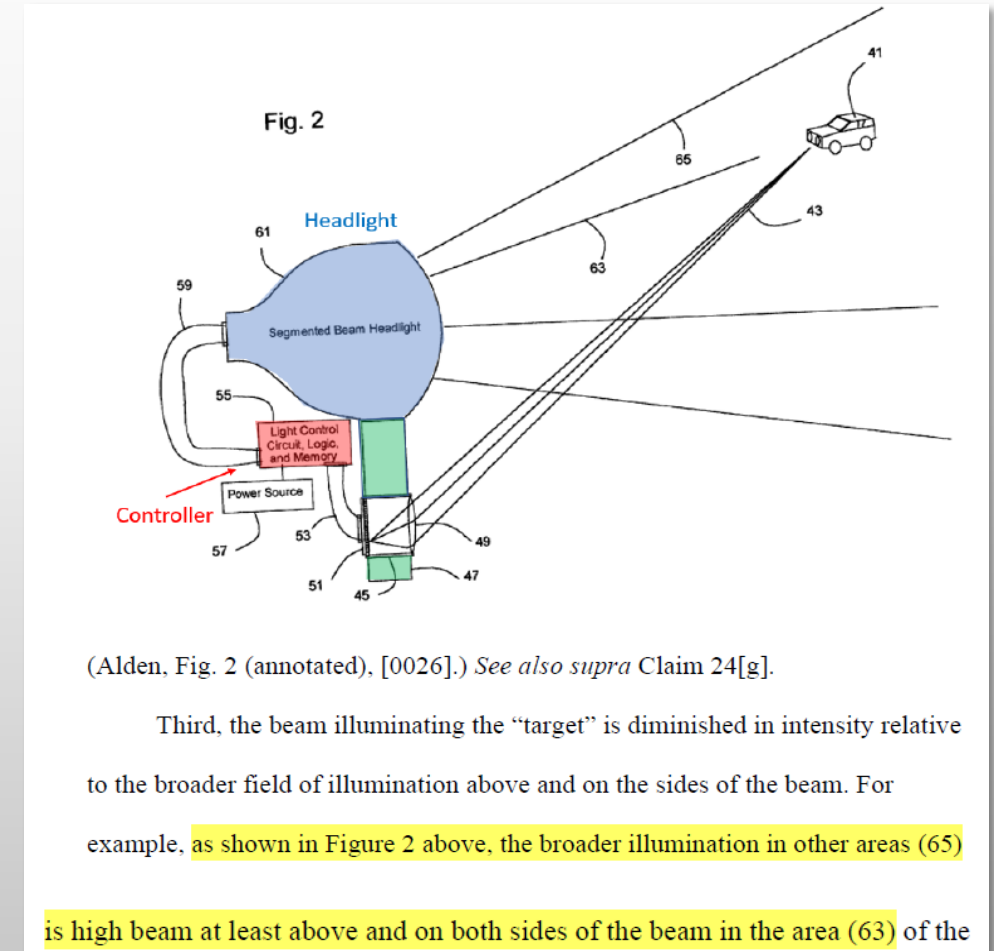
Q. Okay. Now, is figure 2 -- is this a top view or a side-view of the segmented beam headlight?

A. I think this is a top view. It can be a side-view as well, but my first thought it was a top view.

Ex. 2041, 51:15-19

01040, Paper 2, 36, 40-41.) Moreover, given Petitioner's expert's opinion that these figures are largely conceptual, as well as the completely skewed perspectives, it is difficult to say that these figures show anything definitive. (Ex.2041, 51:13-19.) As

1039 POR, 42



(Alden, Fig. 2 (annotated), [0026].) See also *supra* Claim 24[g].

Third, the beam illuminating the “target” is diminished in intensity relative to the broader field of illumination above and on the sides of the beam. For example, as shown in Figure 2 above, the broader illumination in other areas (65) is high beam at least above and on both sides of the beam in the area (63) of the

1039 Pet., 41-42

Ultimately...

Additionally, Petitioner has not specifically argued that Figure 5 of Alden shows a single row of a two-dimensional LED, let alone offered any supporting evidence or explanation. Petitioner is “master of its complaint” (*SAS Institute, Inc v.*

1039 POR, 34; *see also* 1040 POR, 36-37

Given the lack of a clear disclosure and key gaps in how the hypothetical structure would be put together and then operate, at best Petitioner identifies ambiguities as to how Figure 5 should be interpreted—which establish that Petitioner has failed to meet its burden of proof. *See Wasica Fin. GmbH v. Cont’l Auto Sys., Inc.*, 853 F.3d

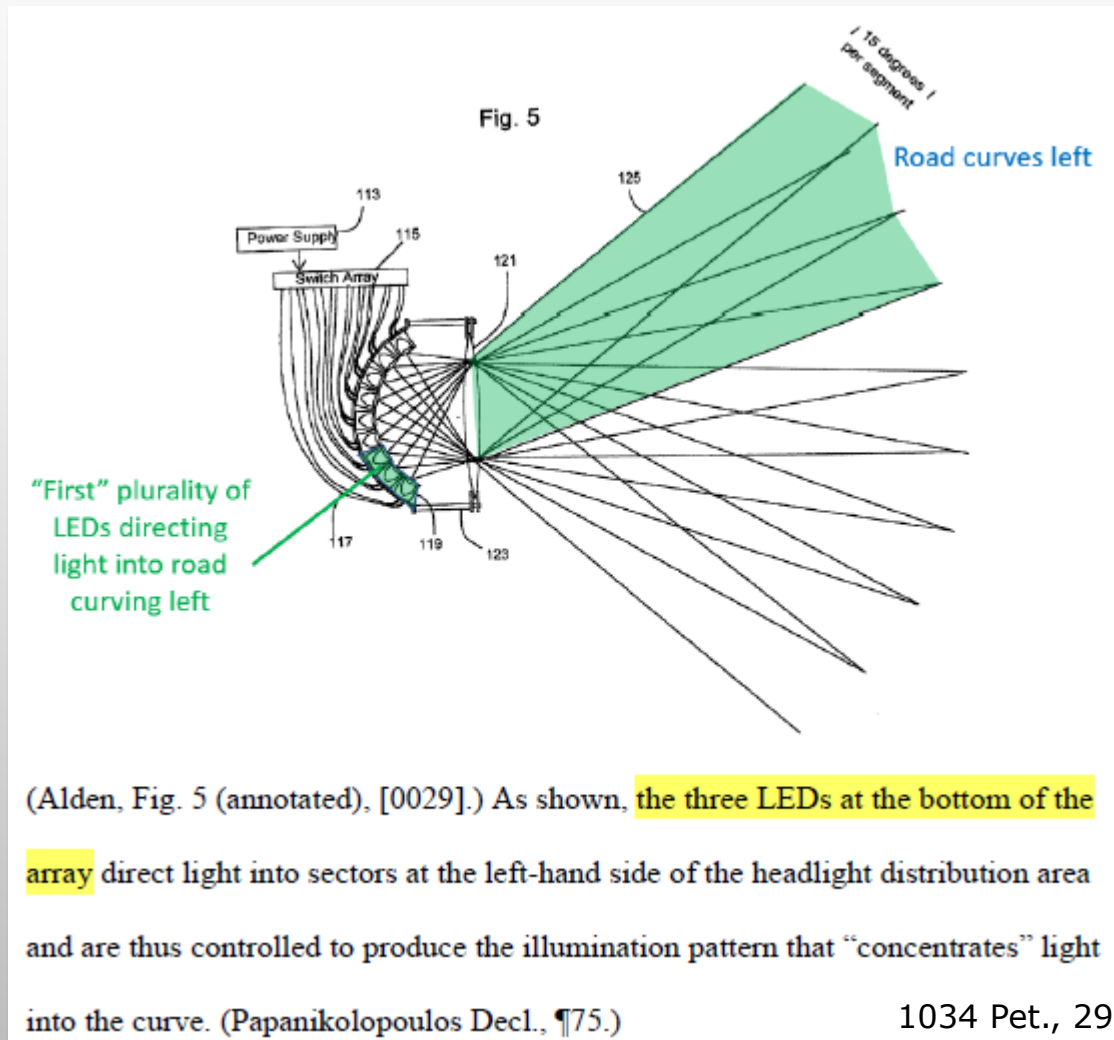
1039 Sur-Reply, 10; *see also* 1040 Sur-Reply, 5

The 1034 Petition has similar defects

Petitioner's argument relies on Alden's two-dimensional switch array (from Figure 3) to control and power the Figure 5 one-dimensional LED array—creating

1034 Sur-Reply, 13

One Dimensional Usage in '029 (1034)



Same Petition Issue

Were Figure 5 interpreted, or modified, to include additional rows of LEDs, Petitioner had an obligation to explain this interpretation in the Petition if it wanted to rely on it. Alden lacks details regarding how the hypothetical structure would be put together, specifically the shape of the LED structure, which informs the control strategy and resultant beam spread. (Ex.2040, ¶¶80-87.) In his deposition, Petitioner's expert was unable to provide the above, needed details-avoiding the issue altogether in his second declaration. (See Ex.2041, 56:25-57:11, 108:11-

1034 Sur-Reply, 17

Same Problem

sources”) to dimmed, low beam light.” (Pet., 69.) The Petition is devoid of any suggestion that Figure 5 includes vertical stacks of LEDs that provide emission control in a second dimension, with multiple foci. (See e.g., Pet., 15, 29, 40-41, 65-66.) Likewise, the Petition unequivocally relies on the Figure 3 two-dimensional switch array to power the one-dimensional LED array from Figure 5. (Pet., 55-59.)

1034 Sur-Reply, 14

Alden's Figure 5 Disclosure is Not Clear and Requires Speculation

Dr. Papanikolopoulos (re Structure):

Q. Okay. So does the figure 3 description affect the total beam spread of the figure 5 embodiment?

A. The figure 3 can inform. But, again, this is a concept. So if you look at the number of rows on 77 and 79, it's not clear how many. Assuming that each element controls one LED, it's not clear and I cannot count here.

* * *

So it doesn't give me any information how many rows, how many columns we have. It's a concept diagram. There are no dimensions, no scale.

Ex. 2041, 108:11-109:5

Dr. Papanikolopoulos (re Function):

A. From the diagram -- I will only speculate from this diagram.

Q. Okay. So, in your opinion, do the beams overlap?

A. Again, I don't want to speculate on this one because I don't have the exact distance between the LEDs, the placement of LEDs, the angle, the curvature associated with this curve that we see here.

Ex. 2041, 110:24-111:8

Failure of Proof: Non-Functional Combination

Petitioner's Combination Not Presumed Enabled

nine switches using the logic of Figure 3. Alden is **not** presumed enabled for the combination of elements proffered by Petitioner because **Alden does not disclose the combination of elements proffered by Petitioner.**

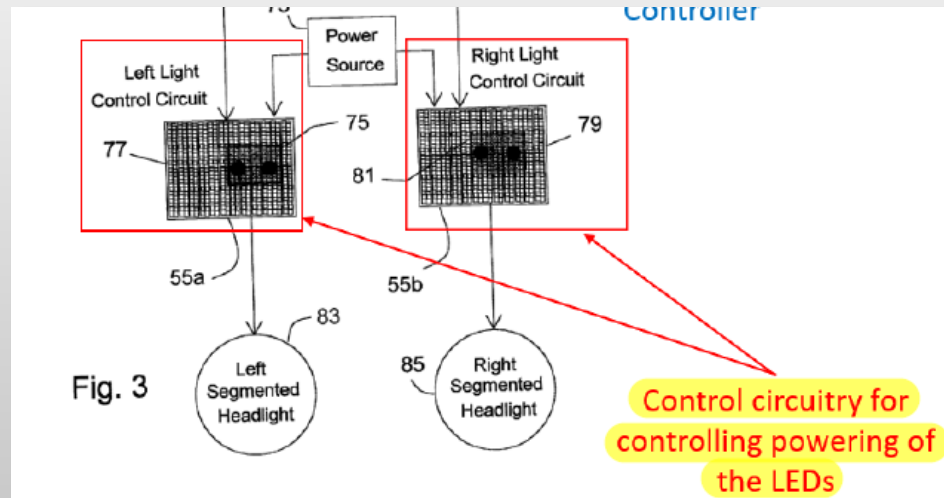
1039 Sur-Reply, 8; *see also* 1040 Sur-Reply, 3

2D Switch Array + 1D LED Array

Petitioner **chose** to use the two-dimensional switch array for its proofs, **including** reliance on both “horizontal and vertical” coordinates. (Petition, 25, 32-33.)

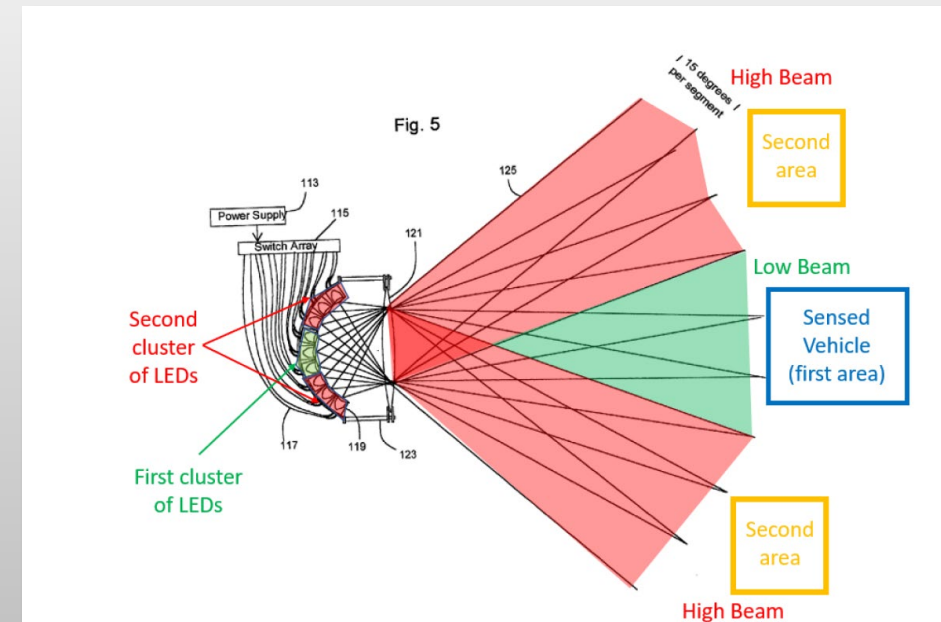
1039 Sur-Reply, 7; see *a/so* 1040 Sur-Reply, 2

Petitioner:



1039 Pet., 25
1040 Pet., 38

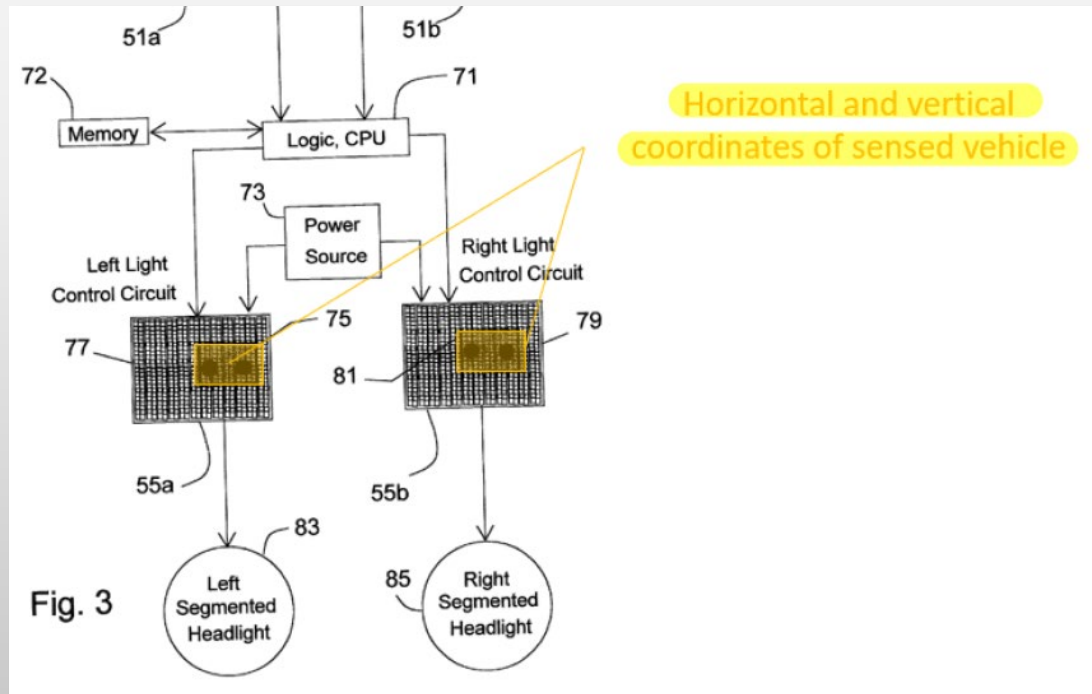
discussed, Alden’s lighting elements 119 are “on a curve along the focal point of a headlight lens 121 such that *the light* from each lighting element goes into a



1039 Pet., 34-35
1040 Pet., 32-33

2D Switch Array – Vertical and Horizontal

Petitioner:



1039 Pet., 33; see also 1040 Pet., 38

Petitioner Never Refutes Non-functionality

Patent Owner:

Ex.2040, ¶111.) Because Figure 6 generates a two-dimensional array of collimated light and Figure 3 shows a two-dimensional sensor and switch array, the two are compatible. Without altering Figure 5, no such compatibility exists. Given the fundamental differences between the Figure 6 electro-chromatic second embodiment and the Figure 5 LED first embodiment, the two embodiments are not analogous. Accordingly, that the Figure 6 embodiment uses “switch array similar to 115 and the process previously described herein” **lacks sufficient precision and detail to establish how the two-dimensional switch array in Figure 3 could be used to operate the one-dimensional array in Figure 5.** (Ex.2040, ¶111.)

That **same description also undermines a conclusion that the mere discussion of the two-dimensional switch array shown in Figure 3 demonstrates that the LED headlight shown in Figure 5 works with such a two-dimensional array.** (See, e.g., DI, 15-16; Ex.2040, ¶112.) To the contrary, **Figure 5 depicts a single-row LED array in contrast to a two-dimensional light sensor and a two-dimensional switch array shown in Figure 3 without teaching how the single-row LED array shown in Figure 5 would be controlled by such.** (Ex.1005, ¶[0029]; Ex.2040, ¶112.) Significantly,

Petitioner:

(POR, 30-33, 39-43.) Patent Owner then argues that a POSITA would not understand how to use this single row of LEDs with the two-dimensional switch array of Figure 3. As the Board correctly found in its Institution Decision, however, Patent Owner is wrong about Figure 5. (Institution Decision (“DI”), 13-16.)

1039 Reply, 5

1039 POR, 31-32; see also 1040 POR, 34-35

Claim 40: Alden does not deal
with multiple vehicles

Claim 40 requires

determine a first cluster of the LEDs illuminating at least a first portion of a first other vehicle ...

determine a second different cluster of the LEDs illuminating at least a second portion of a second other vehicle ...

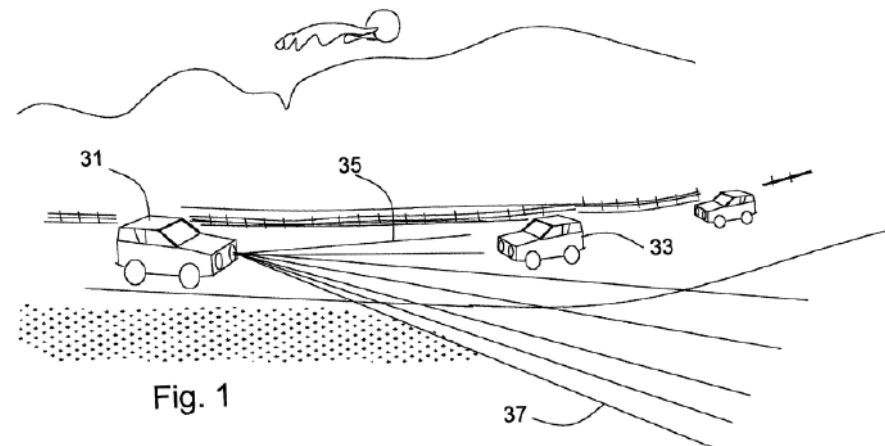
Claim 40[i] and 40[k] from 1039 Pet., 46, 47-49

Argument never explains how

40[i]: determine a first cluster of the LEDs illuminating at least a first portion of a first other vehicle based at least in part on data from one or more of the sensors indicating a first position associated with the first other vehicle;

Alden discloses Claim 40[i]. (Papanikolopoulos Decl., ¶95.) Alden discloses selecting (“determining”) a first cluster of LEDs that emit light toward an oncoming vehicle, based in part on sensor data indicating the position of that vehicle. *See supra* Claims 24[i]-24[j].

Claim 40[i] from 1039 Pet., 46



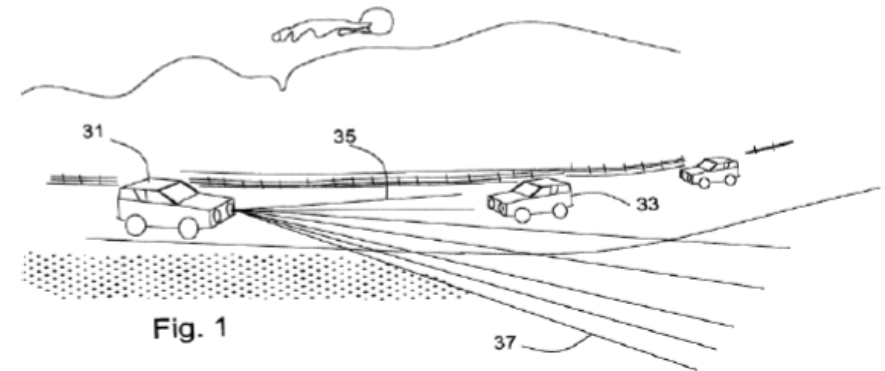
(Alden, Fig. 1, [2005].) Alden’s system provides a “specific means for *sensing locations of vehicles* and independent illumination control,” and can automatically provide high beams in sectors “where *no vehicle* is detected.” (*Id.*) Thus, as a POSITA would have understood, if Alden’s system detects a second vehicle (e.g., after sensing light from the headlamps of such vehicle), *it would determine the vehicle position using its sensor array 51a-51b and CPU 71 and select the cluster of LEDs associated with that position that should be dimmed.* *See supra* Claims 24[i]-24[j]. This would result in the selection of a second, different cluster of LEDs associated with the second vehicle’s position:

Claim 40[k] from 1039 Pet., 48

No evidence of HOW multiple vehicles are handled

Ex.2040, ¶133.) Neither of those statements specifically describes concurrent detection of multiple vehicles but rather are simply references to vehicles encountered in the distribution area serially over time by an equipped vehicle.

1039 POR, 44



(Ex.1005, FIGURE 1)

Indeed, there is no teaching in Alden of how multiple (e.g., four or more) spots of detected light would be grouped or evaluated in order to designate sectors in the distribution area corresponding to each of multiple oncoming vehicles and select those beam segments of the equipped vehicle headlights to be dimmed. (Ex.2040,

1039 POR, 45

Reason to modify is not a proof of a teaching

Further, no POSITA would read Alden such that when the headlights of two oncoming vehicles are detected in the sensor arrays (such as those shown in Figure 3), Alden will dim the light to only one vehicle, while ignoring and shining high beam light at the other. (Papanikolopoulos Decl., ¶97.) This would be illogical and contrary to a core purpose of Alden, namely that “*concurrently all areas with other drivers present* receive low beams so as to minimize the glare for [] betterment of other drivers.” (Alden, Abstract.)⁷

1039 Reply, 17

Alden lacks requisite teachings for anticipation

Other aspects of the Alden disclosure support the latter interpretation: 1) Figure 1 illustrates an unnumbered vehicle positioned behind oncoming vehicle 33, rendering its lamps undetectable to first vehicle 31—or, at a minimum, lacks sufficient scale or perspective to draw any useful conclusions; 2) Figures 2-4 and ¶¶[0026]-[0028] depict and describe a process exclusive to dual illuminated spots; 3) the Alden disclosure provides no explanation for how the detection system would handle the detection of multiple pairs, to configure the groupings of multiple left and right sensed light pairs and sensor maps; and 4) Alden provides no explanation for how the detection system would handle odd groupings of detected light (which could arise if a front vehicle was partially blocking one of the headlights of a rear vehicle), specifically how the process would function without left and right sensed light “pairs.”

1039 Sur-Reply, 17

As such, without more, the ambiguous Figure 1 and the use of plural nouns, along with a complete lack of any teaching as how to handle more than two detected point sources, fails to clearly establish that Alden discloses simultaneous detection of multiple vehicles. Alden’s use of plural nouns, at best, identifies an ambiguity—which is insufficient to support an anticipation challenge. *See, e.g., In re Turlay*, 304 F.2d 893, 899 (CCPA 1962).

1039 Sur-Reply, 18

Alden - Linear LED Array

Regarding the Figure 5 LED first embodiment, Alden merely describes a row of LEDs positioned along the focal point of a lens. (Ex.1005, ¶[0029]; Ex.2040, ¶98.) Alden never mentions any additional rows/columns of LEDs next to the single row of LEDs shown in Figure 5, let alone provides an explanation of how LEDs in any such additional rows/columns of a two-dimensional array would be configured to work relative to a single focal point. (Ex.2040, ¶98.) Alden's depiction of the row of LEDs being positioned along the focal point of the lens undermines any conclusion that the Figure 5 LED embodiment expressly discloses a two-dimensional array. (Ex.2040, ¶98; DI, 17.)

1040 POR, 25; see also 1039 POR, 31

On the contrary, with respect to the second and third embodiments, shown in Figures 6 and 10 respectively, Alden shows both a lamp configuration and a two-dimensional array depiction. Yet, with respect to Figure 5, Alden merely shows the lamp configuration and no array depiction. Given Alden's express disclosure of arranging the LEDs "on a curve along the focal point" of the lens, (Ex.1005, ¶[0047]) it is reasonable to understand that Alden only intended usage of a single row of LEDs for this embodiment, and that anything else would require "speculation" outside the four corners of Alden's teachings. (Ex.2040, ¶100.)

1040 POR, 26; see also 1039 POR, 32

Reply – Misstatement of Argument

Given how closely Alden tracks the challenged claims, Patent Owner focuses most of its Response on a sweeping argument that Alden fails to “enable” its own disclosure and thus cannot be an invalidating reference. (POR, 30-34 (claim 24), 39

1039 Reply, 1 *see also*
1040 Reply, 1

significant aspects of the actual enablement standard. Disclosures in prior art publications are presumed enabled. *In re Antor Media Corp.*, 689 F.3d 1282, 1287-88 (Fed. Cir. 2012); *Amgen Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1355 (Fed. Cir. 2003). Patent Owner, not Petitioner, bears the burden to show non-enablement. *Id.* And Patent Owner must specifically show that “undue

1039 Reply, 2; *see also*
1040 Reply, 2;
1034 Reply, 2

(*See, e.g.*, DI, 15-16.) However, Alden never describes Figure 5 as such. Instead, Alden merely describes a row of LEDs positioned along the focal point of a lens. (Ex.1005, ¶[0029]; Ex.2040, ¶111.) Alden never mentions any additional rows/columns of LEDs adjacent to the single row of LEDs shown in Figure 5, let alone provides an explanation of how LEDs in any such additional rows/columns of a two-dimensional LED array would be configured to work relative to that focal point. (Ex.1005, ¶[0029]; Ex.2040, ¶111.) To the contrary, Alden’s description of 1039 POR, 31; *see also* 1040 POR, 34; 1034 POR, 57

15-16; Ex.2040, ¶112.) To the contrary, Figure 5 depicts a single-row LED array in contrast to a two-dimensional light sensor and a two-dimensional switch array shown in Figure 3 without teaching how the single-row LED array shown in Figure 5 would be controlled by such. (Ex.1005, ¶[0029]; Ex.2040, ¶112.) Significantly, Petitioner’s expert indicated that it is not clear and that he could not explain how the switch array shown in Figure 3 controls the LED array shown in Figure 5 to create the beam spread illustrated therein.

1039 POR, 32; *see also* 1040 POR, 35

Actual argument

depicts “a sectional view of one row of LEDs in this array.” (Reply, 5.) As stated in the Patent Owner Response (“POR”) because Alden presents three distinct embodiments with varying structural configurations of light sources, optics and materials, a POSA would not look to the second and third embodiments to interpret the first LED embodiment, let alone as clear support to modify the actual Figure 5 disclosure. (POR, 9-11.) See *Microsoft Corp. v. Biscotti, Inc.*, 878 F.3d 1052, 1069

1039 Sur-Reply, 6 citing POR 15-18;
see also 1040 Sur-Reply, 1

the claimed invention.” Accordingly, Petitioner’s anticipation proofs should be limited to the disclosure associated with Figure 5.

1039 Sur-Reply, 7; see also 1040 Sur-Reply, 1

While Figure 3 may provide **switch control logic** common to all three embodiments, at no point does Alden say, or show, that Figure 3’s two-dimensional switch array is used with Figure 5’s one-dimensional LED array. Yet, Petitioner **chose** to use the two-dimensional switch array for its proofs, including reliance on both “horizontal and vertical” coordinates. (Petition, 25, 32-33.)

On Reply, Petitioner attempts to use the presumption of prior art “disclosures” being enabled to burden shift. (Reply, 1-3.) While prior art disclosures are presumed to be enabled, Petitioner’s arguments are entitled to no

such presumption. Because Petitioner does not rely on an express disclosure, but rather modifies Figure 5 using Figure 3 and piecemeal descriptors—no presumption attaches.

1039 Sur-Reply, 7-8; see also 1040 Sur-Reply, 2

Actual teachings

A careful reading of the description of Figure 5 reveals the flaw in Petitioner's underlying argument. Alden expressly teaches/shows the following: 1) the Figure 5 array as a single row of LEDs (Ex.1005, Figure 5); 2) "[e]ach lighting element [is] controlled by a corresponding switch" (*Id.*, ¶¶[0029], [0047]); and 3) "[e]ach switch is controlled by the CPU and logic previously described." (*Id.*) Then Alden immediately gives an example of what this statement means – "for example, the power 119 is controlled by the CPU which dictates its respective switch characteristics such that. . . the power. . . is controlled . . .(*Id.*)

1039 Sur-Reply, 8 *see also*
1040 Sur-Reply, 2-3

Thus, Alden discloses an array of 9 LEDs, where each of the 9 LEDs is controlled by a corresponding switch, and control of the power via switches is controlled by the CPU. (POR, 32-33.) What is **not** present is any teaching that the LED array is controlled by the switch arrays 55a and 55b previously described. Any presumption of enablement for Figure 5 would only attach to the expressly disclosed teachings—a nine-element one-dimensional LED array controlled by nine switches using the logic of Figure 3. Alden is **not** presumed enabled for the combination of elements proffered by Petitioner because Alden **does not disclose the combination of elements proffered by Petitioner**.

1039 Sur-Reply, 8 *see also*
1040 Sur-Reply, 3

Inherency

section of a two-dimensional array, Alden lacks sufficient precision and detail to “necessarily require” an interpretation of the Figure 5 LED embodiment as a section of a two-dimensional array. *Verve, LLC v. Crane Cams, Inc.*, 311 F.3d

1039 Sur-Reply, 9; see also 1040 Sur-Reply, 4

Alden is clear that Figure 5 is *not limited* to a single row of LEDs. Nowhere does Alden call the LEDs a “row” or indicate they are “one dimensional,” as Patent Owner suggests. Instead, Alden discloses that Figure 5 illustrates “the segmented headlight” comprised of an “array” of lighting elements. (Alden, [0029], Fig. 5.)

In sum, when considering the full disclosure of Alden, it is clear that Figure 5 is not limited to a single row of LEDs.³ Patent Owner’s arguments that Alden is not

1039 Reply, 5, 8; see also 1040 Reply, 5, 8

Alden does not "Identify Vehicles"
or "Classify Objects"

Claim 8

- 8: An illuminating device ... comprising:
a light fixture including a multiplicity of directional light sources...
a camera for obtaining images of the illuminated area functioning as a detector for at least one of (i) light detector..(v) a detector for sensing at least one of work surfaces and road objects and at least one of vehicles and people;
a controller for adjusting a light intensity and a direction of each of the directional light sources;
a processor with stored algorithms and data for identifying at least one of ... (v) road objects, people and/or vehicles...which is used by said processor for determining illumination within the illuminated area using at least one of artificial intelligence, pattern recognition...

1039 Ex. 1001, Claim 8

Unrefuted construction of "Identify":

Identify: "to show to be a certain person or thing; to fix the identity of; to show to be the same as something or someone assumed, described, or claimed." (Ex.2065, 902.)

1039 POR, 21

'551 Patent- Intrinsic Evidence

information to the logical controller. Using real time image processing methodologies with image and scene recognition technology known in the art, room or outdoor area elements, objects and people are identified. Using face recognition techniques an individual may be identified and personal

Ex. 1001, 63:9-12;
1040 Sur-Reply, 10

Petitioner's Proofs

Unrefuted construction:

Identify: “to show to be a certain person or thing; to fix the identity of; to show to be the same as something or someone assumed, described, or claimed.”
(Ex.2065, 902.)

1039 POR, 21

Petitioner:

information from the sensors regarding patterns of sensed light. (Alden, [0027].)
When there is an oncoming vehicle, light from it “passes through [the] primary lens 49” in sensor unit 45, converges, and “fall[s] upon one or more sectors [] within the detector array 51 where it is detected”:

* * *

1039 Pet., 77

logic and CPU 71 and stored in a memory 72” as a “map of sensed light.” (*Id.*, [0027]-[0028], Figs. 3-4.) *See also supra* Claim 24[e].

CPU 71 then compares these maps and assesses whether they appear to be vehicles, including based on the “intensity” and “distance” of the light patterns. (*Id.*, [0028], Fig. 4.) If the light patterns are determined to be a vehicle, then CPU 71 will adjust illumination of light in the sector(s) containing those patterns, instructing the control circuitry to, for example, power the lighting elements to switch to low beam light or to high beam light, depending on whether they direct light to the sectors where the other vehicle is located. (Alden, [0027]-[0029].) *See also supra* Claim 24[g].

1039 Pet., 78

vehicles or level of accuracy. Regardless of whether Alden could at times, theoretically, identify a non-vehicle as a vehicle does not mean that Alden does not “identify” vehicles. “Prior art that sometimes explicitly meets the claim elements is

1039 Sur-Reply, 12

Alden's Actual Teachings

Unrefuted Construction:

Identify: “to show to be a certain person or thing; to fix the identity of; to show to be the same as something or someone assumed, described, or claimed.”
(Ex.2065, 902.)

1039 POR, 21

[0027] FIG. 3 is a more detailed illustration of the information flow, processes and architecture of the elements described in FIG. 2. In practice, a left sensor 51a and a right sensor 51b are used concurrently. The 51a detects the two headlights of 41 at a first illuminated spot 43a and a second illuminated spot 43b respectively. These spots of light fall upon a photon detector array which otherwise doesn't receive significant light (in this illustration). Electrons corresponding to the position and intensity of light are categorized by a logic and CPU 71 and stored in a memory 72.

* * *

segmented headlight which will be on high beam. The 75 area is significantly larger than the headlight dots that were initially received by 51a and 51b because, the CPU has made assumptions about the space that may potentially be occupied by the driver of the sensed vehicle. The CPU logic flow is described in FIG. 4. Likewise, a right shaded circuit area 81 indicates the areas of a segmented headlight control switch array switches which will cause portions of the right headlight to be dim while a non-shaded right circuit area 79 represents the portions of the right segmented headlight which will be on high beam. The 81 area is significantly larger than the headlight dots that were initially received by 51a and 51b because, the CPU has made assumptions about the space that may potentially be occupied by the driver of the sensed vehicle. (The shaded areas of 55a and 55b are for

* * *

distance 41 is from 47. Triangulation is thus used by the CPU to determine the distance which 41 is from 47. This distance information is used to determine the intensity of light that will be produced by the 61 in the corresponding headlight sectors. Information from the 72 and 71 is sent to

Ex.
1005,
¶[0027]

Alden/Kondo does not teach “*identifying. . . vehicles.*”

Claim 8: a processor with stored algorithms and data for identifying vehicles . . . which is used by said processor for determining illumination . . . using pattern recognition.

Petitioner:

Second, Alden’s processor determines illumination within the illuminated area using at least “pattern recognition.” (Papanikolopoulos Decl., ¶¶141-142.) For example, Alden’s logic CPU 71 is connected to sensors 51a-51b and receives information from the sensors regarding patterns of sensed light. (Alden, [0027].)

1039 Pet., 76-77

CPU 71 then compares these maps and assesses whether they appear to be vehicles, including based on the “intensity” and “distance” of the light patterns. (*Id.*, [0028], Fig. 4.) If the light patterns are determined to be a vehicle, then CPU 71 will

1039 Pet., 78

Dr. Papanikolopoulos:

A. No. What I'm saying is the following:
There are two main use cases in Alden. One is

basically headlights maximizing visibility for the driver and minimizing -- we discussed this.

The second one is actually using the same logic, which is described in figures 3, 4, and 5. I detect that, so my dots here in the figure 3 are going to be the reflectors. The reflectors are going to be something that corresponds -- it will have the same appearance on the image like the headlights.

Ex. 2041, 79:25-80:8

Claim 48 - “classify an object” is distinct from “identify a vehicle” in claim 8; Alden teaches neither

1040 Sur-Reply, 7

48[i]: [1] illuminate a portion of at least one object, indicated by data from at least one of the one or more sensors, [2] by selecting a first cluster of the LEDs to emit first light directed towards a first area including the at least the portion of at least one object, [3] the first area determined based at least in part on the data, [4] the first cluster selected based at least in part on known aimings of light associated with the first cluster determined to correspond to the first area, and [5] **the first light determined based at least in part on classifying the object based at least in part on the data; and**

Claim 48[i] from 1040 Pet., 31-33

The legal and factual predicate for Petitioner’s claim 48 proofs is defective. Petitioner unsuccessfully attempts to stretch Alden’s teachings to outline an anticipation argument for claim 48. It does so, however, by presenting an anticipation argument for the “*classify an object*” limitation that replicates its proofs for the “*identify a vehicle*” limitation of claim 8. (Reply, 9-10.) Petitioner’s **claim 48 proof thus fails to address the differences in claim language, rendering it per se deficient**. While the two limitations are linked—to classify an object the system must first be able to identify multiple objects—they address different end applications.

1040 Sur-Reply, 7

Petitioner:

Fifth, the “first light” (*e.g.*, low beam) is determined based on “classifying the object.” As discussed, Alden determines whether the object is an oncoming vehicle, based on sensed light above a threshold, and if it is determined to be an oncoming vehicle (such as based on light emitted from its headlights). Alden project a dim, low beam light in the area of the oncoming vehicle. *See supra* Claim 48[g].

1040 Pet., 33-34

Detect vs. Identify vs. Classify

Alden thus discloses nothing more than detecting light above a threshold. (Ex.2040, ¶117.) The ordinary meaning of “detect” is to discover the presence or existence of something⁵, which is a binary determination. (Ex.2040, ¶117.) Therefore, the ordinary meaning of the term “detect” is clearly different from that of “classify” previously noted. (Ex.2040, ¶117.) Simply detecting light above a threshold and then merely assuming that such light always indicates the presence of an oncoming vehicle is not performing the function of assigning an object a classification among multiple classes or types of objects. (Ex.2040, ¶117.) Indeed, Petitioner’s expert has noted that “detection and tracking are simply preliminary steps in the task of vehicle classification.” (Ex.2063, 37.) It is only by

1040 POR, 32

'551 Patent – Intrinsic Evidence

F.3d 1303, 1312-13 (Fed. Cir. 2005). To define the ordinary meaning, Patent Owner turned to the dictionary meaning of “*classify*,” which in conjunction with the '551 Patent specification, informed the ordinary meaning of “*classify an object*” as requiring “arranging or grouping an object into one of multiple object classes according to some system or principle.” (POR, 7-8, 30; *See, e.g.*, Ex.1001, 44:67-45:3, 51:59-67, 52:19-27, 52:66-53:4, 63:9-12, 64:46-49, 69:54-57, 76:33-39.) The specification repeatedly discusses the system’s ability to identify various objects using image data and then differentially illuminate a scene based on the type of object(s) detected. (*Id.*)

1040 Sur-Reply, 10

action between light sources and the detectors. The detector pixels 197 can then be used to obtain images of the room which the controller 195 can assess as furniture, equipment or occupants. Pattern recognition methods known in the art, including neural networks, can provide a generalized stored application library of usages to the controller or the controller is an artificial intelligence controller and can learn the actual room usage with time. Outputs from the CCD arrays

are analyzed by appropriate computational means employing trained pattern recognition technologies, to classify, identify or locate the contents. These techniques known in the art are covered in texts such as: Schalkhoff, Pattern

Ex. 1001, 44:63; *see also* 1040 POR, 9-10

Claim 48 - “classify an object” is distinct from “identify a vehicle” in claim 8; Alden teaches neither - IPR2023-01040

“The ‘551 Patent’s specification explicitly refers to ‘*classify*’ as distinct from ‘*identify*’ when it states: ‘Outputs from the CCD arrays are analyzed by appropriate computational means employing trained pattern recognition technologies, to **classify, identify or locate** the contents.’” (Ex.1001, 44:63-45:3.)

1040 Sur-Reply, 9-10

First, under the ordinary meaning of the claim term *classifying the object*, Alden fails to expressly or inherently describe that element. Per the claim construction principles laid out in *Phillips v. AWH Corp*, the ordinary meaning of “classify” is to arrange or group in classes according to some system or principle.⁴ (Ex.2040, ¶112.) That ordinary meaning is supported by the specification of the ‘551 Patent, which describes identifying and classifying between different types of objects, such as a person, sign, or vehicle. (See, e.g., ‘Ex.1001, 44:67-45:3; 51:59-67; 52:19-27; 52:66-53:4; 63:9-12; 64:46-49; 69:54-57; 75:48-62, 76:33-39.)

1040 POR, 30; see also Sur-Reply, 10

“In a preferred embodiment, using pattern recognition techniques the ALDF 190 is semi or fully automatic . . . The detector pixels 197 can then be used to obtain images of the room which the controller 195 **can assess as furniture, equipment or occupants.**” (*Id.*, 44:33-63.)

1040 Sur-Reply, 10

Claim 48: ordinary meaning of “*classify an object*”: “arranging or grouping an object into one of multiple object classes according to some system or principle.” (1040 POR, 30.)

Petitioner’s proofs for “*classify an object*”:

Fifth, the “first light” (*e.g.*, low beam) is determined based on “classifying the object.” As discussed, Alden determines whether the object is an oncoming vehicle, based on sensed light above a threshold, and if it is determined to be an oncoming vehicle (such as based on light emitted from its headlights), Alden project a dim, low beam light in the area of the oncoming vehicle. *See supra* Claim 48[g]. (1040 Pet., 33-34.)

Patent Owner argues Alden does not disclose “classifying” objects because, according to Patent Owner, Alden merely detects incoming light and then “assumes” of the existing of an oncoming vehicle. (POR, 29-31.) . . . Alden unequivocally discloses “classifying” objects, including oncoming vehicles. A key purpose of Alden is to “sense the locations of other vehicles” and control the headlights in response to the “sensed vehicle[s].” (Alden, [0006]; see also [0008], [0003]-[0005], [0025]-[0029]; Papanikolopoulos Decl., ¶51.) (1040 Reply, 9.)

New Reply arguments:

Patent Owner proposes construing “classify” based on a portion of a dictionary definition. (POR, 28.) There is no basis to limit the claims in this way, but even under this definition, Alden still discloses “classifying” objects, as it arranges or groups something (*e.g.*, light source(s)) in classes (*e.g.*, vehicles and non-vehicles) based on a system or principle (*e.g.*, whether the intensity of detected light is above a threshold or distance). (Reply, 10-11, FN 6.)

Claim 48 does not require a particular method to classify objects or level of accuracy. Regardless of whether Alden could at times, theoretically, classify a non-vehicle as vehicle does not mean Alden does not “classify” objects. (1040 Reply, 10)

Predictive Curve: Identify Road Curvature
'551 Patent Claims 26,34,42,50,58,66,74,82

Claims 26, 34, 42, 50, 58, 66, 74, 82 ('551 Patent) require "identify[ing] an upcoming road curvature"

'551 Patent:

26. The illuminating device of claim 24, wherein the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to:

identify an upcoming road curvature along a road on which the motor vehicle is traveling; and

accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the at least one headlamps.

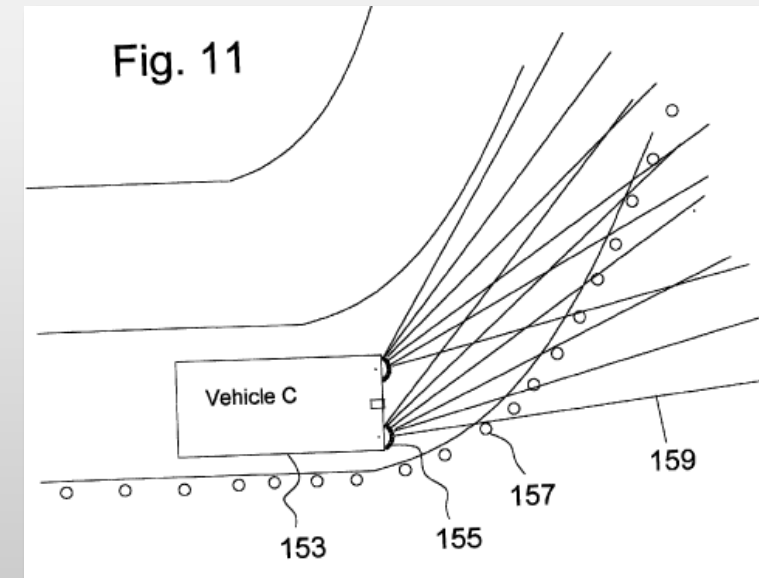
Alden does not disclose “*identify[ing] an upcoming road curvature*”

'551 Patent claims 26,34,42,50,58,66,74,82

Alden:

[0036] FIG. 11 illustrates the art of the present invention being used to concentrate light to look around corners in response to road conditions. An equipped vehicle 153 senses that the road turns by receiving light from reflectors such as a reflector 157.

Ex. 1005, ¶[0036]



Ex. 1005, Fig. 11

Petitioner's New Adjustable Threshold Argument

551 Patent claims 26,34,42,50,58,66,74,82

Petitioner Argues:

"[T]o distinguish between different objects, . . . the threshold intensity or distance would simply be **adjusted** based on the object type."

1039 Reply, 10 FN4 (emphasis added); see *also* 1040 Reply, 21 FN7; 1034 Reply, 3

Dr. Papanikolopoulos:

The second one is actually using the **same logic**, which is described in figures 3, 4, and 5. I detect that, so my dots here in the figure 3 are going to be the reflectors. The reflectors are going to be something that corresponds -- it will have the **same appearance on the image like the headlights.**

Ex. 2041, 80:3-8

Predictive Curve: Increase Illumination
'551 Patent Claims: 27,35,43,51,59,67,75,83
'029 Patent Claims: 1, 12, 23

Claims 27,35,43,51,59,67,75,83 ('551 Patent) require "*changing illumination*" and Claims 1,12,23 ('029 Patent) require "*increas[ing] light in a direction of the road curvature*"

'551 Patent:

27. The illuminating device of claim 26, wherein:

...
the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to accommodate the road curvature by **changing illumination in at least a direction of the road curvature** by adaptation of the light pattern in at least one of color, intensity or spatial distribution by modification of light associated with one or more of the LEDs.

'029 Patent:

1. A system, for a motor vehicle, comprising:

...
a memory storing instructions that, when executed by one or more of the one or more processors, enable the one or more processors to:

...
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

Alden does not disclose “*changing illumination*” or “*increas[ing] light in a direction of the road curvature*” because all beam segments remain at high intensity

'551 Patent claims 27,35,43,51,59,67,75,83
'029 Patent claims 1, 12, 23

Alden:

Signals are sent to each of the headlight control circuit zones that need to be dimmed to restrict the amount of current to the corresponding headlight zones such that they are dimmed in a dimming process **109**. Zones which are not dimmed remain on high beam.

Ex. 1005, ¶[0028]

Thus light from one section has been diverted to become diverted light **151** (in low beam where a vehicle (not shown) has been sensed) while the light from other segments are not diverted (are in high beam) where no vehicle is sensed.

Ex. 1005, ¶[0035]

Using a switch array similar to **115** and the processes previously described herein, the light intensity flowing through each individual segment is controlled by causing each individual electro-chromatic cell to filter out the desired amount of light such that the distribution of light is dim where a car is sensed and on high beam elsewhere.

Ex. 1005, ¶[0030]

All embodiments maximize the areas receiving high beams for the benefit of the equipped vehicle driver while concurrently all areas with other drivers present receive low beams so as to minimize the glare for to betterment of other drivers.

Ex. 1005, Abstract

Alden does not disclose “*changing illumination*” or “*increas[ing] light in a direction of the road curvature*” because all beam segments remain at high intensity

'551 Patent claims 27,35,43,51,59,67,75,83
'029 Patent claims 1, 12, 23

Petitioner Argues:

“Alden’s system does not default all LEDs to the high beam state unless otherwise dimmed ‘in all embodiments’ as Patent Owner argues. Rather, Alden explains that its system can be used for ‘many applications[.]’”

1039 Reply, 18; see also 1040 Reply, 23 |
1034 Reply, 4

Petition:

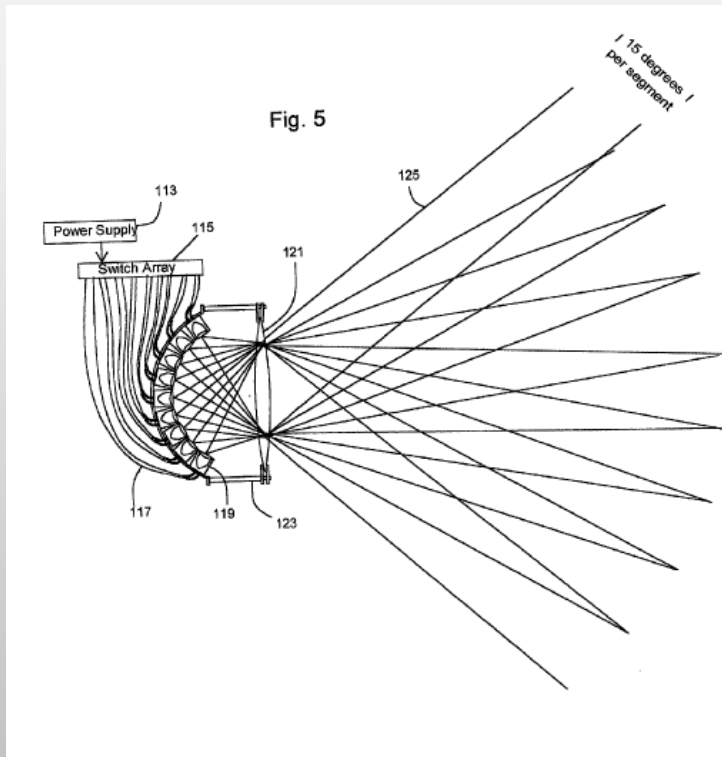
Alden recognizes that in an illuminated area, such as a vehicle’s field-of-view, different sectors (“sub-areas”) have different illumination requirements; for example, areas with no oncoming vehicle should have “maximum light” while areas with a “driver of an oncoming vehicle” should have “minimum glare.” (Alden, Abstract, [0005], [0029].)

1039 Pet., 66; see also 1040 Pet., 73 | 1034 Pet., 13

Alden's Figure 5 Embodiment illuminates the full light pattern therefore it does not teach "changing" or "increas[ing] light in a direction of the road curvature"

'551 Patent claims 27,35,43,51,59,67,75,83
'029 Patent claims 1, 12, 23

Alden:



Ex. 1005 Fig. 5

Dr. Papanikolopoulos:

Q. Okay. But, in normal driving conditions when there's no oncoming traffic and no curves, the Figure 5 embodiment would illuminate the full pattern shown in Figure 5; is that correct?

A. Yes.

1034 Ex. 2067, 17:21-25

Q. Are you proposing adding additional LEDs to what's shown in Figure 5 or you're saying that's what is shown in Figure 5?

A. I say such as shown in Figure 5.

1034 Ex. 2066, 112:2-5

Alden does not disclose “changing” or “increas[ing] light in a direction of the road curvature” because the Fig. 5 embodiment lacks optical steering capability

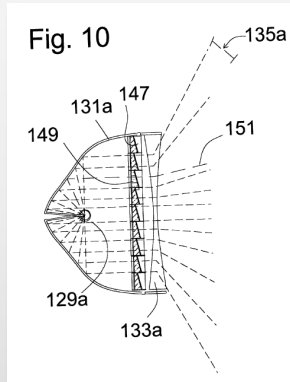
'551 Patent claims 27,35,43,51,59,67,75,83
'029 Patent claims 1, 12, 23

Petitioner Argues:

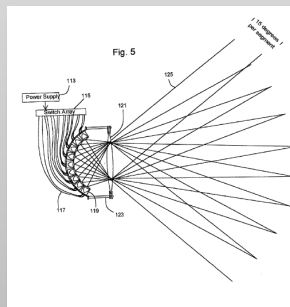
“As the steering wheel ‘rotates ‘x’ degrees,’ the system calculates the new planned direction of the vehicle and **changes the direction** of the headlight output 197 a corresponding ‘f(x)’ degrees.”

1039 Pet., 55; see also 1040 Pet., 63;
1034 Pet., 21

Alden:



Ex. 1005, Fig. 10



Ex. 1005, Fig. 5

Dr. Turk:

71. A third, further distinct embodiment is shown in Figure 10, in which the headlight system employs a single light source 129, a collimating reflector 131, and electro-optic refractive material 147, 149 to produce multiple light beam segments. (Ex. 1005, ¶¶[0032-0035], Figure 10.) The CPU 71 can control the electro-optic refractive material 147, 149 to change the direction of the beam segments passing through that element. (Ex. 1005, ¶¶[0032-0035], Figure 10.)

1039 Ex. 2040, ¶71; see also 1040 Ex. 2040, ¶71

Alden does not disclose “changing” or “increas[ing] light in a direction of the road curvature” because the Fig. 5 embodiment does not redirect light

'551 Patent claims 27,35,43,51,59,67,75,83
'029 Patent claims 1, 12, 23

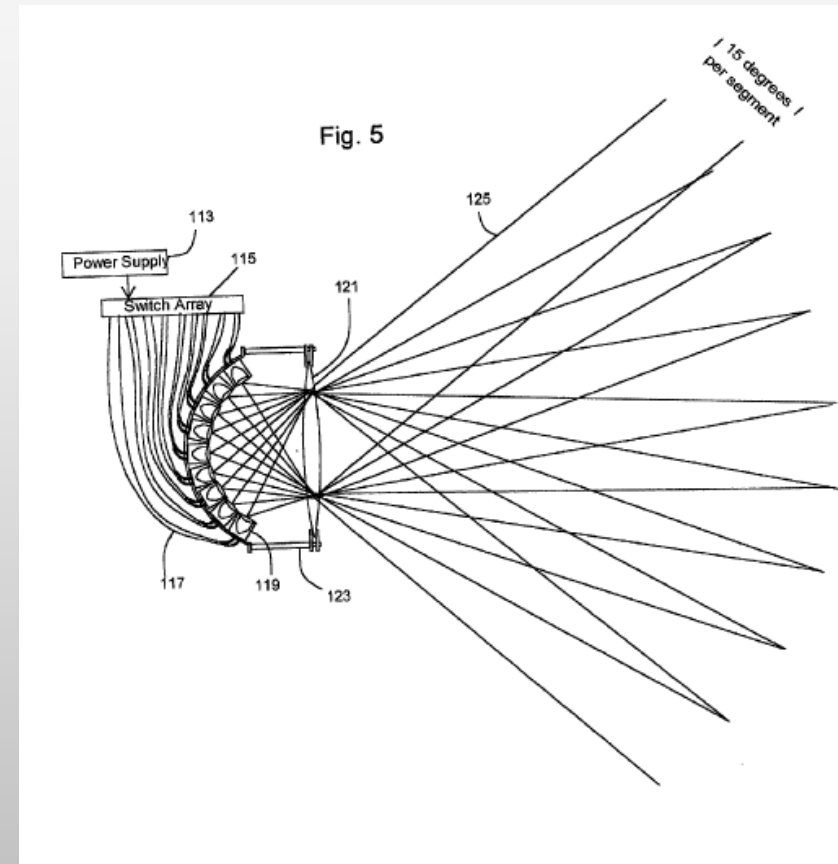
Alden Embodiment 1, Fig. 5:

In a first embodiment [Fig. 5], individual light elements in array are individually controlled with regard to intensity to provide dim beam areas and high beam areas concurrently.

Ex. 1005, Abstract

3. The headlight system of claim 1 [Fig. 5] wherein said vehicular headlight system comprises at least one head light which contains at least two lighting elements each of said elements being individually controllable with regard to light intensity emitted there from.

Ex. 1005, Claim 3



Ex. 1005, Fig. 5

Alden does not disclose “*changing*” or “*increas[ing]* light in a direction of the road curvature” because the Fig. 5 embodiment does not redirect light

'551 Patent claims 27,35,43,51,59,67,75,83
'029 Patent claims 1, 12, 23

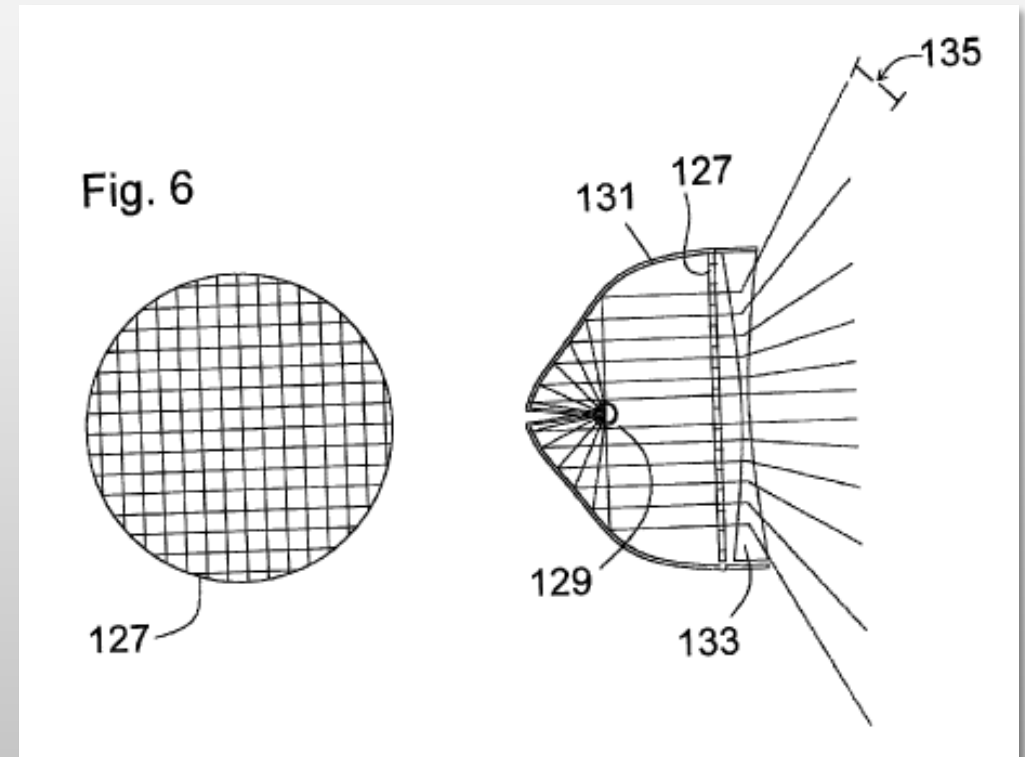
Alden Embodiment 2, Fig. 6:

In a second embodiment [Fig. 6], individual electro-chromatic elements in array are individually controlled so as to provide a means to create dim beam areas and high beam areas concurrently.

Ex. 1005, Abstract

4. The headlight system of claim 1 [Fig. 6] wherein said vehicular headlight system comprises at least one head light which contains at least two light filter elements, each of said elements being individually controllable with regard to controlling the intensity of light permitted to pass there through.

Ex. 1005, Claim 4



Ex. 1005, Fig. 6

Alden does not disclose “changing” or “increas[ing] light in a direction of the road curvature” because the Fig. 5 embodiment does not redirect light

'551 Patent claims 27,35,43,51,59,67,75,83
'029 Patent claims 1, 12, 23

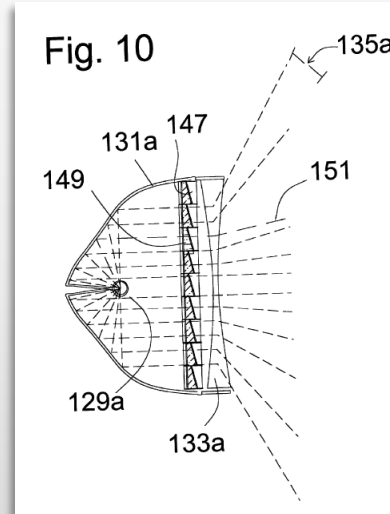
Alden Embodiment 3, Fig. 10:

In a third embodiment [Fig. 10], variable refractive segments in array are individually controlled to **redirect** beam portions such that high beam and dim beam areas are created concurrently.

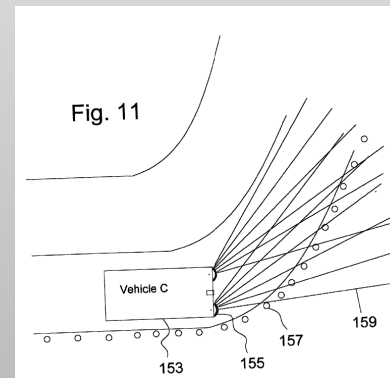
Ex. 1005, Abstract

5. The headlight system of claim 1 [Fig. 10] wherein said vehicular headlight system comprises at least one head light which contains at least two light **directing** elements, each of said elements being individually controllable with regard to the output direction of light permitted to pass there through.

Ex. 1005, Claim 5



Ex. 1005, Fig. 10



[0036] FIG. 11 illustrates the art of the present invention being used to concentrate light to look around corners in response to road conditions. An equipped vehicle **153** senses that the road turns by receiving light from reflectors such as a reflector **157**. The responding headlights **155** direct light into the corner to maximize the driver's ability to see there. The directing of light can be achieved with the segmented sensing elements and segmented light distribution elements described herein.

Ex. 1005, ¶[0036]

Predictive Curve: Upcoming Curves
'551 Patent Claims 26,34,42,50,58,66,74,82
'029 Patent Claims: 1, 12, 23

Claims 26, 34, 42, 50, 58, 66, 74, 82 ('551 Patent) require “*identify[ing] an upcoming road curvature*” and Claims 1,12,23 ('029 Patent) further require “*provid[ing] light . . . prior to the . . . road curvature*”

'551 Patent:

26. The illuminating device of claim 24, wherein the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to:

identify an upcoming road curvature along a road on which the motor vehicle is traveling; and

accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the at least one headlamps.

'029 Patent:

1. A system, for a motor vehicle, comprising:

. . .
a memory storing instructions that, when executed by one or more of the one or more processors, enable the one or more processors to:

. . .
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**.

Alden does not disclose “identify[ing] an upcoming road curvature” or “provid[ing] light . . . prior to the . . . road curvature”

Petitioner Argues:

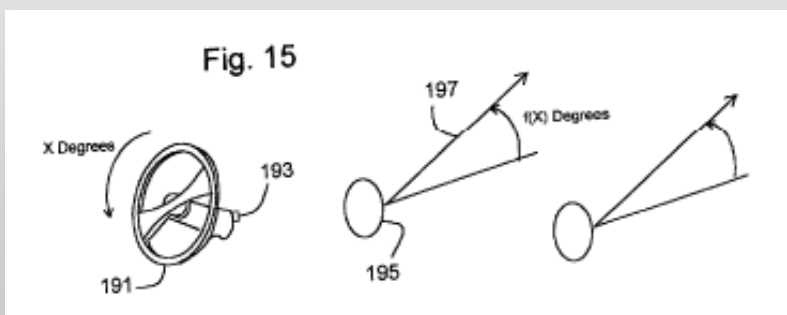
“Additionally, Alden discloses that its system can include a steering wheel ‘rotation sensor’ that detects when the vehicle is planning to turn.”

1039 Pet., 55; see also 1040 Pet., 63

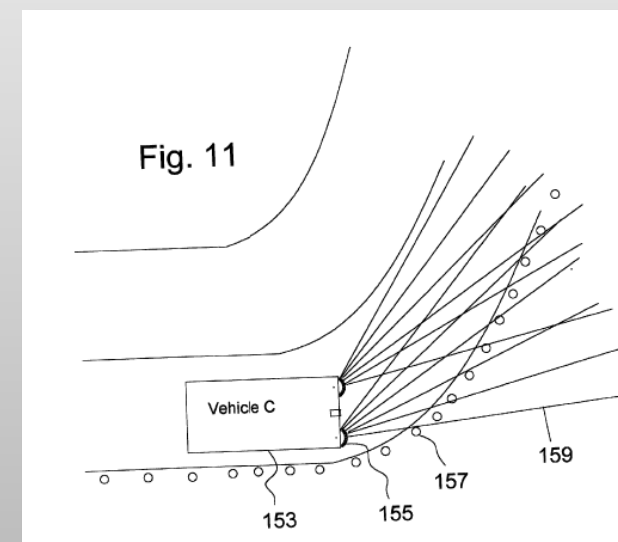
Alden:

The system calculates the new direction of the vehicle and changes the direction of the headlight output 197 a corresponding “f(x)” degrees.

Ex. 1005, ¶[0040]



Ex. 1005, Fig. 15



Ex. 1005, Fig. 11

Alden does not disclose “*identify[ing] an upcoming road curvature*” or “*provid[ing] light . . . prior to the . . . road curvature*”

Petitioner Argues:

“As a driver approaches a road curve, or is going to turn or enter a curve from a stopped position, the driver begins to turn the steering wheel before the vehicle enters the curve.”

1034 Reply, 10-11

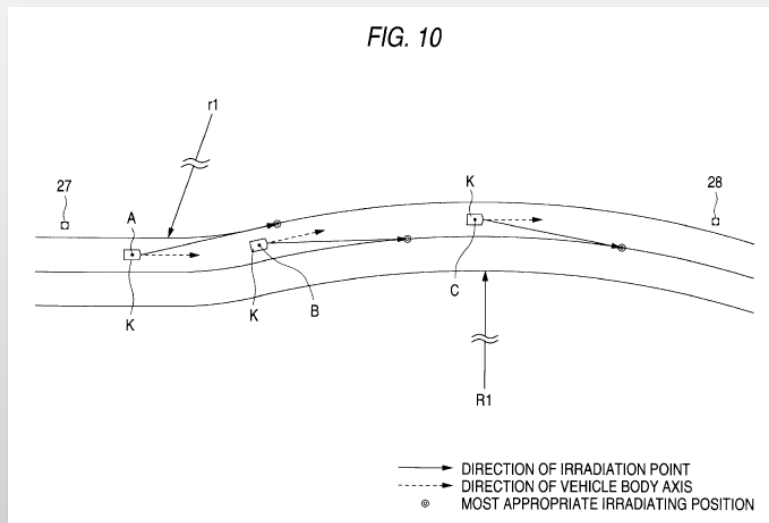
Dr. Papanikolopoulos:

Thus, when a driver turns her steering wheel before moving, in anticipation of an upcoming curve where the vehicle will have to turn, Alden’s system adapts the light output so that it increases illumination illuminating the turn. (*Id.*, [0054].) I should note that one example of this would be when a driver is at a stoplight or a stop sign. As a POSITA would have known, often times the driver would turn their wheel before giving the vehicle gas, so as to be ready to turn after oncoming traffic has passed.

Ex. 1003, ¶67

Alden/Kobayashi does not teach “*provid[ing] light . . . prior to the . . . road curvature*”

Kobayashi:



Ex. 1006, Fig. 10

As shown at point A in FIG. 10, when the vehicle turns to left, the left shoulder is irradiated. When the vehicle turns to right, the right shoulder is irradiated.

Ex. 1006, 15:21-24

Active Optics '029 Patent Claims 21 and 32

'029 Patent Claims 21 and 32 require active optics

12. A non-transitory computer-readable storage medium, storing instructions

19. The storage medium of claim 12, wherein the instructions include

21. The storage medium of claim 19, wherein the instructions include **instructions** that, when executed by the one or more **processors**, enable the one or more processors to **utilize one or more optical control elements** included in the motor vehicle to **control light** from at least the first plurality or second plurality of the LED light sources.

23. A computer-implemented method for adapting light from headlamps of a motor vehicle to accommodate road shape changes, the headlamps including a plurality of LED light sources, comprising

30. The method of claim 23, further comprising

32. The method of claim 30, further comprising utilizing one or more **optical control elements** included in the motor vehicle to **control light** from at least the first plurality or second plurality of the LED light sources.

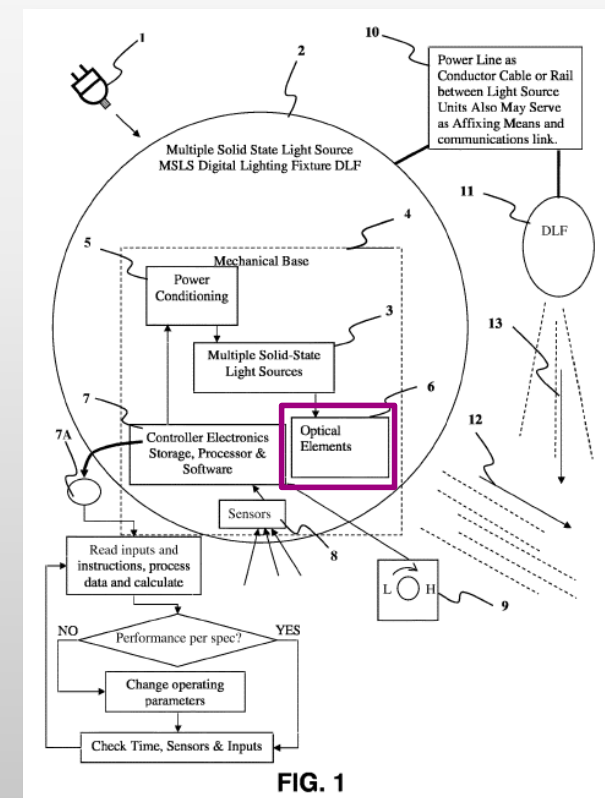
1034 Ex. 1001, Claims 12, 19, 21, 23, 30, 32

The '029 Patent discloses passive and active optics

'029 Patent:

The DLF includes more than one light source 3, which is preferably an electroluminescent solid-state light source but may be any other light source, such as incandescent, high intensity discharge, fluorescent, etc. such that the individual characteristics of each lamp's light are combined in operation to achieve a sum of the characteristics presenting a benefit not achievable from a single source alone. The light sources are affixed or contained within a mechanical device 4, which may serve as containment to all of the components and facilitates affixation to building surfaces. The electric power is received in the correct waveform, voltage and current from the power source 1, or is conditioned within the DLF 2, by power conditioning elements and circuitry 5. 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.

1034 Ex. 1001, 25:5-21



1034 IPR Ex. 1001, Fig. 1 (annotated)

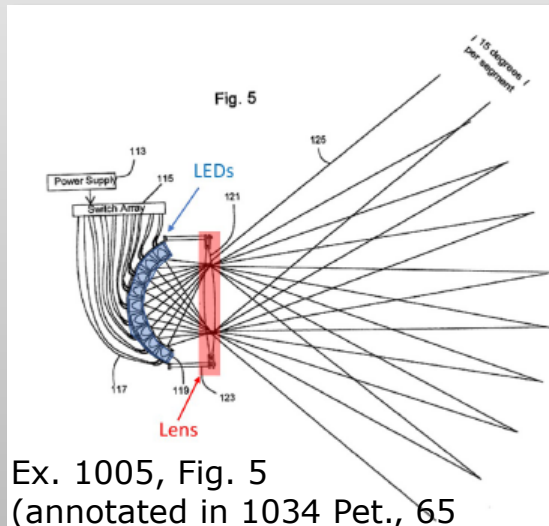
Alden's passive lens 121 does not satisfy the active optics limitations

Petitioner argues:

"When the processor controls the LEDs to emit light, **it utilizes the lens element 121** to direct the light

....

1034 Pet., 64-65 (emphasis added)



21. The storage medium of claim 19, wherein the instructions include **instructions** that, when executed by the one or more **processors**, enable the one or more processors to **utilize one or more optical control elements** included in the motor vehicle to **control light** from at least the first plurality or second plurality of the LED light sources.

23. **A computer-implemented method** for adapting light

....

32. The method of claim 30, further comprising **utilizing one or more optical control elements** included in the motor vehicle to **control light** from at least the first plurality or second plurality of the LED light sources.

Petitioner's proposed Alden combination is Inoperable

Petitioner argues:

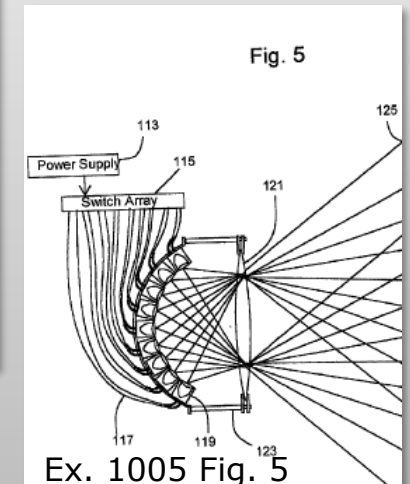
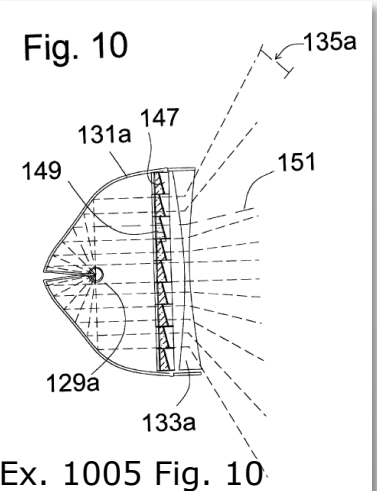
"Alden discloses that its use of refractive elements to 'bend' light can be included in its headlight system, such as that of Figure 5, and a POSITA would have readily understood how to implement the variable refractive elements in such system."

1034 Pet., 67

Dr. Turk:

102. As previously noted, the electro-optical refractive elements 147, 149 and double concave lens 133 of the headlight of Figures 8-10 are designed to work with the collimated light produced by single light source 129a and collimating reflector 131 and would be inoperable with the non-collimated light produced by the LED elements 119 of the headlight of Figure 5. Non-collimated light cannot be directed in any meaningful fashion by the electro-optical refractive elements 147, 149 of the headlight of Figures 8-10 of Alden. Rather, non-collimated light would blend and have different incident angles on those electro-optical refractive elements 147, 149 thereby preventing any meaningful control of individual sectors as well as redirecting much of the non-collimated light they receive away from the desired sectors of the distribution area. The result of any combination thereof

Ex. 2040, ¶102



Other Disputes

'029 Patent: Claims 9, 20, 31

'029 Patent Claims 9, 20, 31

9. The system of claim 8, wherein:
the first plurality and second plurality of LED light sources include at least one common LED light source;
the control of the second plurality of LED light sources is based at least in part on third data received from a non-camera sensor of the motor vehicle;
. . . .

8. The system of claim 1, further comprising one or more cameras positioned to capture data indicating at least one other vehicle ahead of the motor vehicle;
. . . .
control, based at least in part on the position, a second plurality of LED light sources providing light directed towards an area including at least a portion of the other vehicle to diminish glare to a driver of the other vehicle by a decrease to intensity of light directed towards and illuminating the area

1034 Ex. 1001, Claims 8, 9

Petitioner relies on sensors not used for glare control

More specifically, Petitioner cites Alden's equipped vehicle steering wheel rotation sensor or alternatively Kobayashi's GPS sensor as the *non-camera sensor* providing the data required by dependent claims 9/20/31. (*Id.*, 70-71.)

1034 POR, 63

The claims require “the control” to relate to glare reduction

It is thus apparent that the antecedent basis for the limitations the control and the controlling relating to the second plurality of LED light sources recited in dependent claims 9/20/31 are the limitations of control and controlling of a second plurality of LED light sources recited in dependent claims 8/19/29. Moreover, as further recited in dependent claims 8/19/29, such control and controlling must diminish glare to the driver of another vehicle by decreasing intensity of light. (*Id.*, ¶151.)

1034 POR, 64

GPS/Steering data is not used to reduce glare

As a result, the control and the controlling recited in dependent claims 9/20/31 that must be based on data from a non-camera sensor is control and controlling of the second plurality of LED light sources to diminish glare to the driver of another vehicle by decreasing intensity of light. Significantly, however, neither the steering wheel rotation sensor of Alden, nor the GPS sensor of Kobayashi provides data that is used to diminish glare to the driver of another vehicle by decreasing intensity of light.

1034 POR, 64

New Argument on Reply

... - In other words, data from the steering wheel rotation sensor is used to further control the second plurality of LEDs such that dimming to reduce glare is maintained in the direction of an oncoming vehicle as the equipped vehicle turns, by shifting the dimmed light by an amount equal to the turning of the steering wheel. (*Id.*; Petition 70-71.) If it were not, then there would be the possibility that as the vehicle is turned, high beam light instead of the diminished low beam light would be directed at an oncoming vehicle. (EX1010,

1034 Reply, 25

New argument is illogical as well as impermissible

First, Petitioner’s new argument on Reply is impermissible. *Intelligent Bio-Sys., Inc.*, 821 F.3d at 1369 (Fed. Cir. 2016). Second, in the context of the Figure 5 embodiment, which cannot “adjust the direction” of LEDs, the best Alden could do in response to steering is terminate some LEDs. So, Petitioner’s newly identified “shifting beam” problem is a red herring. (Reply, 25.) That is, the beam of Alden would merely be reduced, and any vehicle that was within a portion of the illumination that remained after the beam-reduction would be accommodated in exactly the same manner it was prior to the beam-reduction—it would never have been changed.

1034 Sur-Reply, 23

New argument is further incorrect

Even assuming *arguendo* there was a beam-shift, that beam-shift would be achieved, per Petitioner, by turning on some new LEDs. If there happened to be a vehicle within this new portion of illumination, glare to that vehicle would be addressed based on the vehicle being detected by the camera as being within a sector where illumination now exists.

1034 Sur-Reply, 23

The proof fails

Ultimately, the Alden/Kobayashi/Beam combination simply does not teach controlling LEDs to reduce glare based on any reliance on steering wheel data or map data. Once again, any maintenance of the dimmer light is going to be done exclusively based on the incidence of detected light on the sensor array, which is more than adequate to address the situation Petitioner is newly describing.

1034 Sur-Reply, 24-25

Other Disputes

Petitioner's Impermissible New Ground for Claim 51

'029 Patent Claim 51

51. The illuminating device of claim 50, wherein:

the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to illuminate the at least the portion with light below at least a predefined glare level;

the at least one object includes at least one of a pedestrian, a sign, or another vehicle;

at least one of the first cluster or the second cluster includes a plurality of the LEDs and at least one of the first cluster or the second cluster includes non-contiguous LEDs;

the control of the light emitted from the first cluster includes a change of at least one LED of the cluster to a non-emitting state;

the at least one emission characteristic is different following modification by an optical control element;

the known aimings of light associated with the first cluster is based at least in part on known directionality of light emitted by LEDs of the first cluster exiting from the at least one headlamp; and

the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to accommodate the road curvature by changing illumination in at least a direction of the road curvature by adaptation of the light pattern in at least one of color, intensity or spatial distribution by modification of light associated with one or more of the LEDs.

Petitioner’s new proposed Ground for Claim 51 is impermissible

Petitioner Argues:

“Thus, reading the Petition in context, it is clear the Petition argues **claim 51** is rendered obvious by **Alden** (alone or in combination with Stam) in view of Beam”

1040 Reply, 27

Petition:

V. PRECISE RELIEF REQUESTED
The relief requested is cancellation of the challenged claims, as follows:

Ground	References	Claims ²	Basis
1	<u>Alden</u>	48, 50-51, 53-55, 56-59, 61-63, 64-67, 69-71, 72-75, 77-79, 80-83, 85-87	102/103

1040 Pet., 4-5

11. Dependent Claims 51/59/67/75/83
Alden anticipates and renders obvious Claims 51/59/67/75/83.
(Papanikolopoulos Decl., ¶135.) Claims 51, 59, 67, 75, and 83 are substantially identical to Claims 49, 57, 65, 73, and 81, respectively, except that each

1040 Pet., 65

Extra slides

Claim 32

*create a beam of diminished illumination ...
created in a broader field of illumination
having different intensity than the beam...
the beam diminished in intensity relative to
the broader field of illumination illuminating
at least above ... the beam*

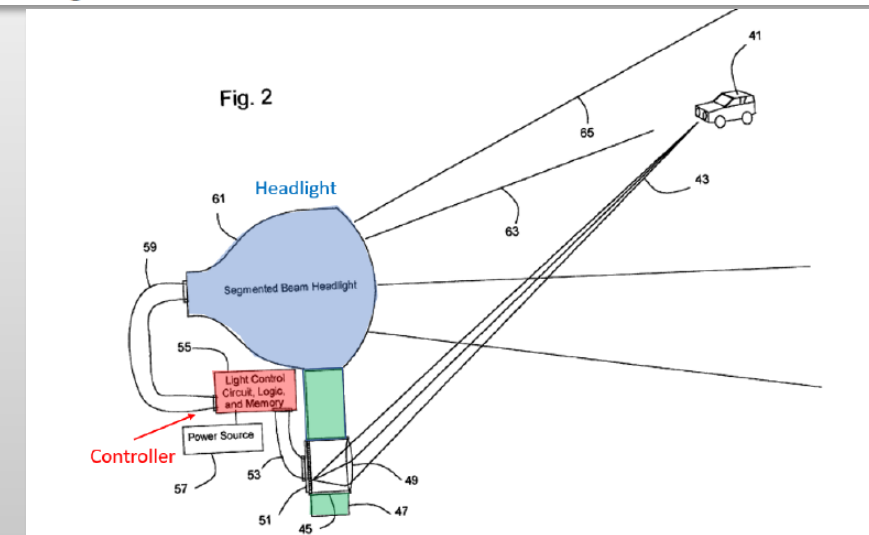
Claim 32[i] from 1039 Pet., 40-43

Second, in Alden this illumination is done by selecting a cluster of LEDs to emit a “first light” (e.g., low beam) in an area that includes the object. As

1039 Pet., 40

area of an oncoming vehicle and causes those LEDs to emit a “first light” (e.g., low beam) in the area (63) of the detected vehicle (41), while other LED groups, such as in other areas (65) (i.e., “the broader field of illumination”), are switched to different light:

1039 Pet., 41



(Alden, Fig. 2 (annotated), [0026].) See also *supra* Claim 24[g].

Third, the beam illuminating the “target” is diminished in intensity relative to the broader field of illumination above and on the sides of the beam. For

1039 Pet., 41

Claim 32

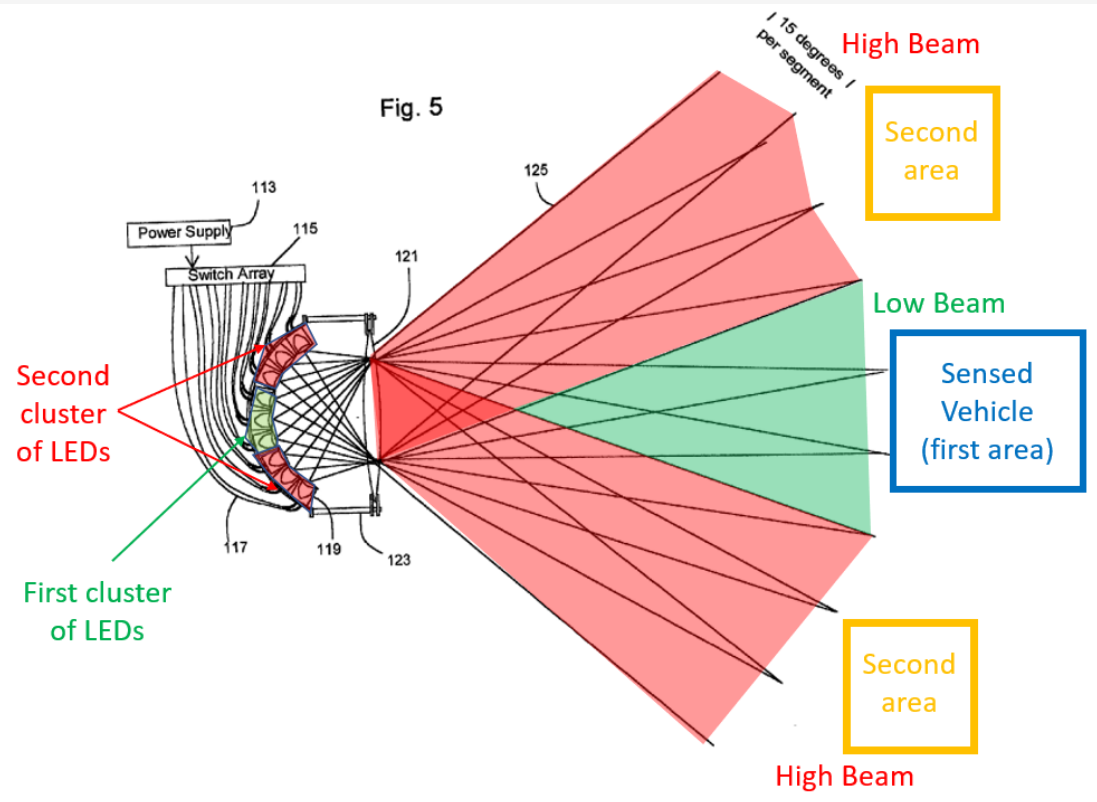
*create a beam of diminished illumination ...
created in a broader field of illumination
having different intensity than the beam ...
the beam diminished in intensity relative to
the broader field of illumination illuminating
at least above ... the beam*

Claim 32[i] from 1039 Pet., 40-43

Once the array is limited to the one-dimensional LED array taught, it is not possible to show “a beam of diminished intensity . . . relative to the broader field illuminating at least above . . . the beam,” per claim 32. Reliance on Figure 2, which lacks perspective, scale and even orientation, is completely misplaced—Petitioner’s expert admitted that these figures are largely conceptual. (POR, 41-42; Ex.2041, 51:13-19.) Absolutely nothing in Alden ever says that the sector between 63 and 65 is *above* the vehicle. (POR, 41.) Based on the disclosed one-dimensional curved array, a POSA would understand that the area “above” the beam aimed at the vehicle is derived from the same light aimed at the vehicle, and therefore not part of the broader field of illumination as claimed. (*Id.*)

1039 Sur-Reply, 13

Claims 24/25



1039 Pet., 30

Petitioner contends that this annotation “accurately illustrates” the concept that “the light sent to the sensed vehicle location [shown in green . . .] is dimmer than the light sent to *all other areas* of the headlight distribution area [shown in red].” (Reply, 15.) Specifically, with reference to claim 24, Petitioner relies on this figure as showing illumination “past” the sensed vehicle. Petitioner’s annotations are however demonstrably inaccurate in the following ways:

- 1) It fails to accurately show the overlapping additive portions of light—for example, while the transparent red “fill” overlaps immediately in front of the lamp, it does not overlap in any of the other diamonds. Because of the

- 3) It is misleading in that it fails to account for the differences in the “cluster” proofs for claims 24 and 25. More specifically, as claim 25 depends from claim 24, the annotated figure fails to address how the “cluster” in claim 25 can be met by a “cluster” of LEDs from both lamps and fails to show the impact of overlapping additive light from the second lamp on the claimed outcome (allegedly shown by the annotated figure) —given that the proof for claim 24, relies on a depiction of a single lamp. This, at a minimum, leaves Petitioner without a complete proof for the system Petitioner ultimately relies on for claim 25.³ Further,

1039 Sur-Reply, 14

1039 Sur-Reply, 15

Claim 48

[1] control light emitted from the first cluster directed towards the first area to be different in at least one emission characteristic, ... from second light emitted from a second, different cluster of the LEDs, [2] directed towards one or more illuminated second areas ... laterally adjacent to the first area.

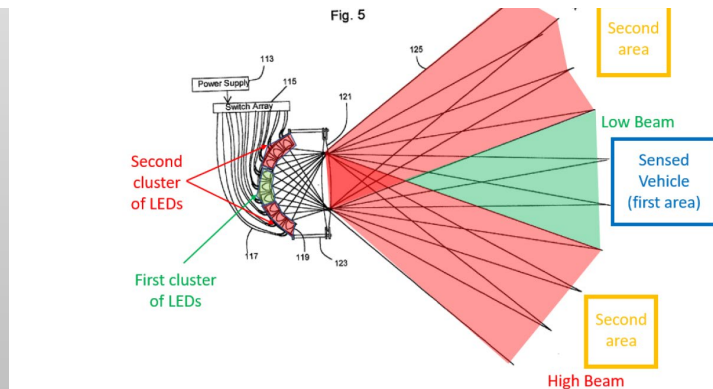
Claim 48[j] from 1040 Pet., 34

Alden discloses Claim 48[j]. (Papanikolopoulos Decl., ¶¶77-78.) First, in Alden the light emitted from the “first cluster” is different in “at least one emission characteristic” (e.g., intensity) from light emitted from a second cluster. (*Id.*, ¶77.) As discussed, Alden discloses (a) reducing light emitted from selected LEDs, which direct light to sectors determined to contain another vehicle (i.e., “first cluster” of LEDs directing light to the “first area”), to dimmed, “low beam” intensity light, and (b) setting the light emitted from the LEDs, which direct light

1040 Pet., 34

(Papanikolopoulos Decl., ¶78.) For example, as shown in Figure 5 above, Alden’s lighting elements each direct light into a “15 degree section of the headlight distribution area” on the same plane (“common elevation”) and next to one another (“laterally adjacent”). (Alden, Fig. 5, [0029].) As can also be seen above, where another vehicle is detected in, for example, a middle sector, that sector will be dimmed while light directed to the sectors at the same elevation and laterally adjacent to the middle zone will be switched to high beam intensity. (*Id.*, Fig. 5, [0027]-[0029]; see also [0025]-[0026], Figs. 1-2 (depicting common elevation, laterally-adjacent sectors of light with differing illumination based on whether another vehicle is present).)

1040 Pet., 35-36



(*Id.*, Fig. 5 (annotated), [0026]-[0029].) See also *supra* Claims 48[g]-[i].⁷

1040 Pet., 35

Claim 48

(Papanikolopoulos Decl., ¶78.) For example, as shown in Figure 5 above, Alden's lighting elements each direct light into a "15 degree section of the headlight distribution area" on the same plane ("common elevation") and next to one another

1040 Pet., 35

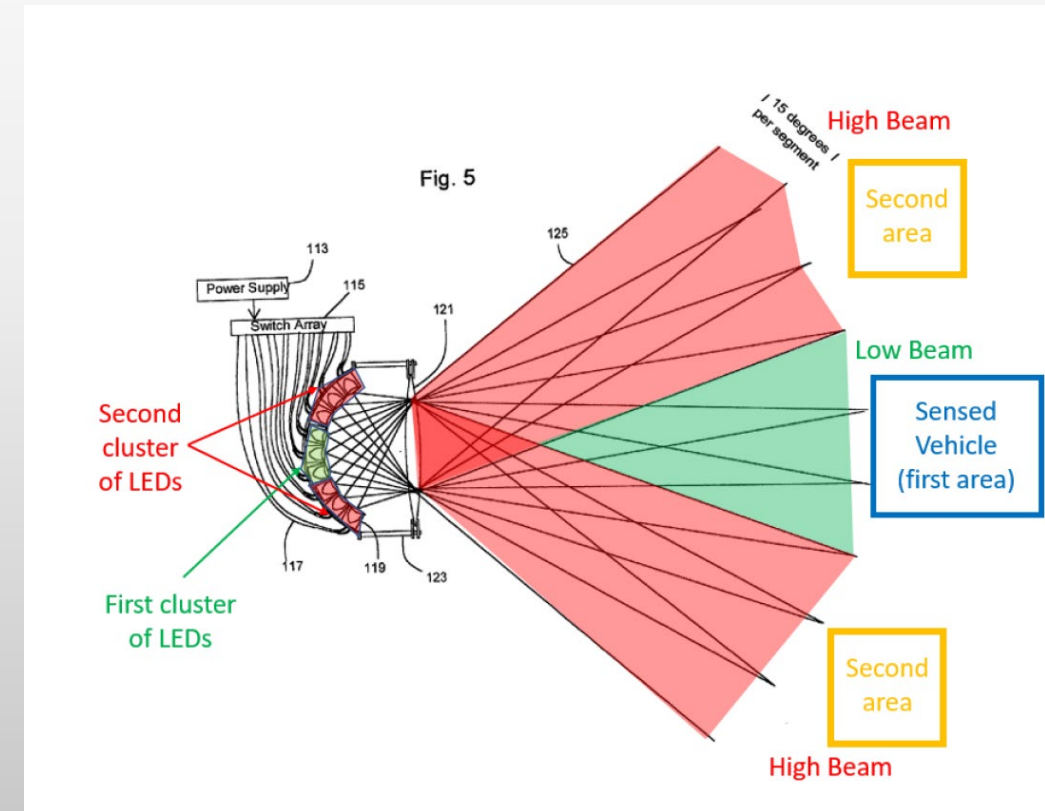
[0027]-[0029]; *see also* [0025]-[0026], Figs. 1-2 (depicting common elevation, laterally-adjacent sectors of light with differing illumination based on whether

1040 Pet., 36

Claim 56

reduce intensity of illumination to non-glaring illumination of a first area ... relative to intensity of illumination on both sides of the first area

Claim 56[k] from 1040 Pet., 40-41

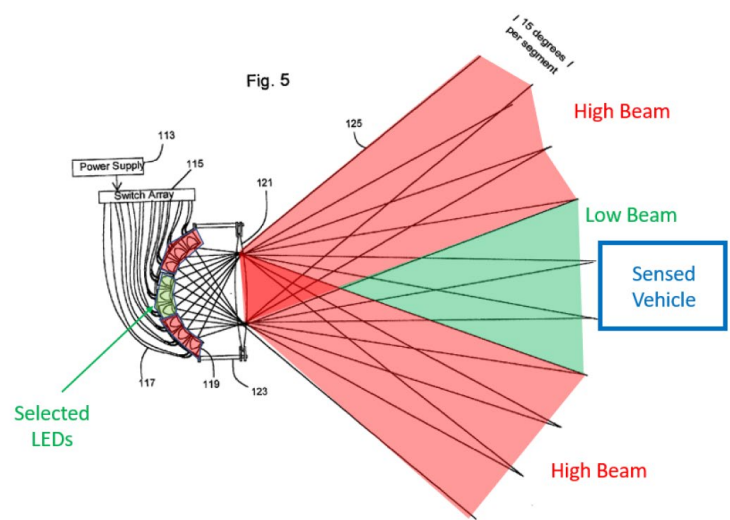


1040 Pet., 42

Claim 72

vary illumination to the target ... relative ... to areas laterally adjacent to the target and provided by at least one LED different from LEDs in the selected cluster; and

Claim 72[I] from 1040 Pet., 54



(Petition, 54)

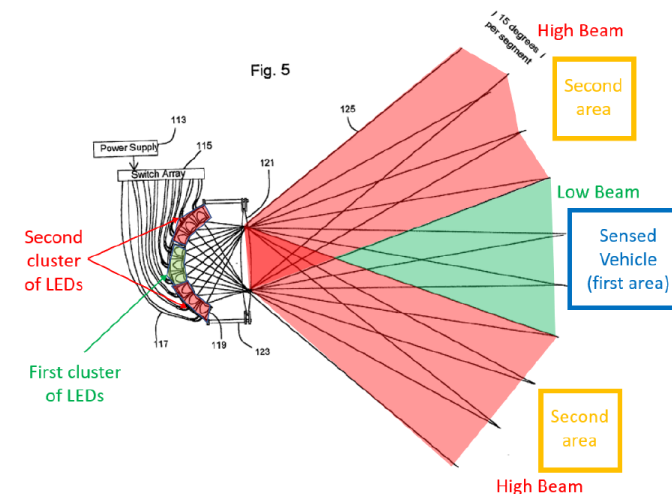
It is clear from this figure that the areas laterally adjacent the target are also illuminated in low beams. (Ex.2040, ¶143.)

1040 POR, 47

discloses varying the illumination provided to the sensed other vehicle (“target”) by reducing light emitted from the selected LEDs to dimmed “low beam” light and switching the light emitted from LEDs directed to areas with no other vehicle present to “high beam.” (Alden, [0026]-[0029].) *See also supra* Claims 48[j], 64[j].

As also discussed above, when the sensed object is an oncoming vehicle, the illumination in sectors of the headlight distribution area directed towards the oncoming vehicle is varied, or dimmed, relative to light illumination in laterally adjacent sectors, which are illuminated with other LEDs switched to “high” beam intensity light. *See supra* Claim 48[j].

1040 Pet., 54-55



(Alden., Fig. 5 (annotated).)

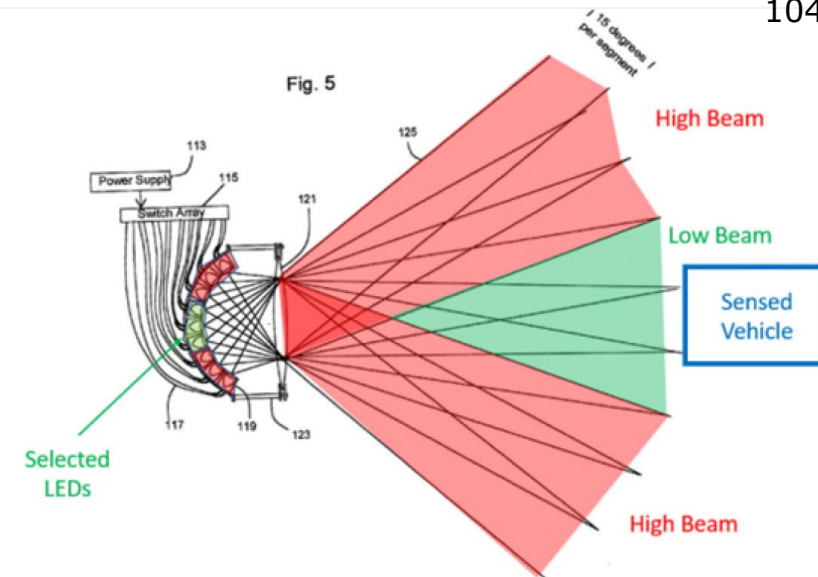
Claim 72

annotated figure noted immediately above, Petitioner's new "buffer" theory in the Reply is flawed. The proposed buffer zone around the target is a new theory of "laterally adjacent" never presented in the Petition. (Reply, 17-20.) Pursuant to the Petition, the "target" is the vehicle. (Petition, 54.) If one looks at the annotated Figure 5 of the Petition, it is quite plain that if the headlight beam is extended, the areas laterally adjacent to the target are illuminated with the green light of the annotation. (*Id.*) That is true regardless of whether a "buffer" is inserted or how rigidly "laterally adjacent" is interpreted.

1040 Sur-Reply, 18

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

1040 Reply, 17-18



(*Id.*) This overly narrow interpretation, that the dimmed light cannot extend even slightly outside the contours of the vehicle (*i.e.*, there can be no buffer), is not supported by the broader, plain language of the claim. All the claim requires is that

Claim 80

Alden fails to teach the above-noted independent claim 80 limitations clearly and unambiguously. Petitioner fails to identify, for example, which LEDs are providing “light associated with one or more of the LEDs aimed laterally adjacent the target on either side.” (Ex.2040, ¶146.) Similar to claim 72, Petitioner does not adequately demonstrate that the claimed change occurs as the target moves, because Petitioner does not demonstrate the subsequent change at a second time, as claimed. (*Id.*)

1040 POR, 49

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

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

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

1040 Reply, 20

noted for claims 48, 56, 64, and 72 above (§ III, IV, V, VI, *supra*), Petitioner’s proof for claim 80 includes an additional material defect. Notwithstanding the fact that, for reasons similar to those presented for claim 72, Petitioner has a proof that does not visually show “LEDs aimed laterally adjacent to the target,” Petitioner’s argument also failed to even identify such LEDs. (§ VI, *supra*; POR, 49.)

Petitioner did not address this deficiency in Reply. (Reply, 20.) Petitioner’s failure to identify the LEDs is fatal to its analysis of the claims. Petitioner’s entire argument for this limitation is based on an analogy to other claims, none of which reference “LEDs aimed laterally adjacent to the target.” (POR, 49.) This failing alone is fatal to the proof, as all elements of the claim are not shown to be met by Alden. While it would have been inappropriate to attempt to cure this noted deficiency on Reply, Petitioner did not even attempt to do so, and thus is completely foreclosed from any future attempt to cure.

1040 Sur-Reply, 20

1040 IPR: POR, 49-50; Sur-Reply, 20

'551 Independent Claims

Claim 8

- 8[pre]: *An illuminating device which provides light to meet an illumination requirement of an illuminated area in which visual activities are performed, where different sub-areas of the illuminated area need to be illuminated at a different intensity and/or at a different spectrum than another sub-area of the illuminated area, comprising:*
- 8[a]: *a light fixture including a multiplicity of directional light sources including at least two directional light sources pointing in different directions thereby illuminating different sub-areas of the illuminated area,*
- 8[b]: *the light fixture having movable structure for aiming the directional light sources mounted thereon in a defined direction;*
- 8[c]: *a camera for obtaining images of the illuminated area functioning as a detector for at least one of (i) a light detector (ii) a spectrum detector, (iii) a motion detector, (iv) a measuring detector for sensing a geometry of the illuminated area, and (v) a detector for sensing at least one of work surfaces and road objects and at least one of vehicles and people;*
- 8[d]: *a controller for adjusting a light intensity and a direction of each of the directional light sources;*
- 8[e]: *[1] a processor with stored algorithms and data for identifying at least one of (i) tasks being carried out by people, (ii) location of people, (iii) frequency of area usage by people, (iv) traffic density in the illuminated area from the sensed geometry, (v) work surfaces, (vi) road objects, people and/or vehicles, and (vii) roadway surface luminance [2] any of which is used by said processor for determining illumination within the illuminated area using at least one of artificial intelligence, pattern recognition, video analytics, and look-up tables [3] wherein said processor, upon calculating the required illumination parameters according to best practice standards, directs the controller to adjust the directional light sources that illuminates the specific sub-areas to meet the illumination requirements of the visual activities.*

Claim 24

- **24[pre]:** *An illuminating device having automatic control of light provided to an illuminated area comprising:*
- **24[a]:** *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;*
- **24[b]:** *a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;*
- **24[c]:** *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;*
- **24[d]:** *one or more processors;*
- **24[e]:** *[1] one or more sensors, including one or more cameras, placed on the structure [2] for detecting coordinate-specific information about the illuminated area, [3] at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;*
- **24[f]:** *a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus,*
- **24[g]:** *said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and*
- **24[h]:** *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:*
- **24[i]:** *determine coordinates corresponding to another vehicle based on the coordinate-specific information; and*
- **24[j]:** *select a cluster of the LEDs that emit light toward at portion of the other vehicle based on the LEDs having emission aimings associated with the first coordinates; and*
- **24[k]:** *change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the cluster to create headlamp illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle.*

Claims 32 and 40

Claim 32

32[pre]-32[h]

Claims 32[pre]-32[h] are nearly identical to Claims 24[pre]-24[h]. See Appendix A. Therefore, Claims 32[pre]-32[h] are disclosed by Alden for the reasons above. See *supra* Claims 24[pre]-24[h].

32[i]: [1] create a beam of diminished illumination illuminating at least a portion of the at least one target with non-glaring illumination, created in a broader field of illumination having different intensity than the beam, [2] by one or more changes to characteristics of first light of a cluster of the LEDs providing the first light directed at the at least a portion and creating the beam, [3] the beam diminished in intensity relative to the broader field of illumination illuminating at least above and on both sides of the beam; and

32[j]: follow, based at least in part on data from one or more of the cameras, the at least one target with the diminished illumination as the at least one target changes location relative to the motor vehicle.

1039 Pet., 39-44

Claim 40

40[pre]-40[h]

Claims 40[pre]-40[h] are nearly identical to Claims 24[pre]-24[h]. See Appendix A. Therefore, Claims 40[pre]-40[h] are anticipated or rendered obvious by Alden for the reasons above. See *supra* Claims 24[pre]-24[h].

40[i]: determine a first cluster of the LEDs illuminating at least a first portion of a first other vehicle based at least in part on data from one or more of the sensors indicating a first position associated with the first other vehicle;

40[j]: diminish glaring illumination of the first other vehicle by a first change to one or more characteristics of first light of at least the first cluster;

40[k]: determine a second, different cluster of the LEDs illuminating at least a second portion of a second other vehicle based at least in part on data indicating a second position associated with the second other vehicle;

40[l]: diminish glaring illumination of the second other vehicle by a second change to one or more characteristics of second light of at least the second, different cluster;

40[m]: wherein the first and second changes decrease intensity of first emission from the first cluster and second emission from the second cluster relative to a third emission, from the at least one headlamp, illuminating an area between the first and second portion.

Claim 48

- **48[pre]:** *An illuminating device having automatic control of light provided to an illuminated area comprising:*
- **48[a]:** *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;*
- **48[b]:** *a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;*
- **48[c]:** *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;*
- **48[d]:** *one or more processors;*
- **48[e]:** *[1] one or more sensors, including one or more cameras, placed on the structure [2] for detecting coordinate-specific information about the illuminated area, [3] at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;*
- **48[f]:** *a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus,*
- **48[g]:** *said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and*
- **48[h]:** *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:*
- **48[i]:** *[1] illuminate a portion of at least one object, indicated by data from at least one of the one or more sensors, [2] by selecting a first cluster of the LEDs to emit first light directed towards a first area including the at least the portion of at least one object, [3] the first area determined based at least in part on the data, [4] the first cluster selected based at least in part on known aimings of light associated with the first cluster determined to correspond to the first area, and [5] the first light determined based at least in part on classifying the object based at least in part on the data; and*
- **48[j]:** *[1] control light emitted from the first cluster directed towards the first area to be different in at least one emission characteristic, based on the first light determination, from second light emitted from a second, different cluster of the LEDs, [2] directed towards one or more illuminated second areas at a common elevation with the first area and laterally adjacent to the area.*

Claim 56

- **48[pre]:** *An illuminating device having automatic control of light provided to an illuminated area comprising:*
- **48[a]:** *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;*
- **48[b]:** *a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;*
- **48[c]:** *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;*
- **48[d]:** *one or more processors;*
- **48[e]:** *[1] one or more sensors, including one or more cameras, placed on the structure [2] for detecting coordinate-specific information about the illuminated area, [3] at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;*
- **48[f]:** *a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus,*
- **48[g]:** *said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and*
- **48[h]:** *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:*
- **56[pre]-56[h]**
- Claims 56[pre]-56[h] are nearly identical to claims 48[pre]-48[h]. See Appendix A. Therefore, Claims 56[pre]-56[h] are disclosed by Alden for the reasons above. See *supra* Claims 48[pre]-48[h].
- **56[i]:** *determine, based on data from one or more of the sensors, a vertical and horizontal position associated with the at least one other vehicle;*
- **56[i]:** *determine, based on data from one or more of the sensors, a vertical and horizontal position associated with the at least one other vehicle;*
- **56[j]:** *select a first cluster of the LEDs based at least in part on at least one of the vertical and horizontal position compared to known aimings of light associated with the first cluster; and*
- **56[k]:** *reduce intensity of illumination to non-glaring illumination of a first area associated with the at least one other vehicle, relative to intensity of illumination on both sides of the first area at elevations common with the first area illuminated by a second cluster of the LEDs, by control of emission from the first cluster.*

Claim 64

- **48[pre]: An illuminating device having automatic control of light provided to an illuminated area comprising:**
 - **48[a]: a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;**
 - **48[b]: a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;**
 - **48[c]: electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;**
 - **48[d]: one or more processors;**
 - **48[e]: [1] one or more sensors, including one or more cameras, placed on the structure [2] for detecting coordinate-specific information about the illuminated area, [3] at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;**
 - **48[f]: a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus,**
 - **48[g]: said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and**
 - **48[h]: memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:**
- Claims 64[pre]-64[h] are nearly identical to claims 48[pre]-48[h]. See Appendix A. Therefore, Claims 64[pre]-64[h] are disclosed by Alden for the reasons above. See *supra* Claims 48[pre]-48[h].
 - **64[i]: select a first cluster of the LEDs having light associated therewith that is directed towards the other vehicle based at least in part on first data from one or more of the sensors indicating a first position associated with the other vehicle;**
 - **64[k]: select a second, different cluster of the LEDs having light associated therewith that is directed towards the other vehicle based at least in part on second, subsequent data from one or more of the sensors indicating a second, subsequent position associated with the other vehicle; and**
 - **64[l]: control a second, subsequent change, to one or more characteristics of the light that is subsequently directed towards the other vehicle, that diminishes glare to the driver of the other vehicle when the other vehicle is at the second position.**

Claim 72

- **48[pre]:** *An illuminating device having automatic control of light provided to an illuminated area comprising:*
 - **48[a]:** *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;*
 - **48[b]:** *a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;*
 - **48[c]:** *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;*
 - **48[d]:** *one or more processors;*
 - **48[e]:** *[1] one or more sensors, including one or more cameras, placed on the structure [2] for detecting coordinate-specific information about the illuminated area, [3] at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;*
 - **48[f]:** *a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus,*
 - **48[g]:** *said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and*
 - **48[h]:** *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:*
- Claims 72[pre]-72[h] are identical to Claims 48[pre]-48[h]. See Appendix A. Therefore, Claims 72[pre]-72[h] are disclosed by Alden for the reasons above. See *supra* Claims 48[pre]-48[h].
 - **72[i]:** *determine a target based on first data from one or more of the sensors;*
 - **72[j]:** *determine a first target location based on the first data;*
 - **72[k]:** *select a cluster of the LEDs having light associated therewith that is directed at the target, determined based on the first target location; and*
 - **72[l]:** *vary illumination provided to the target by the selected cluster, relative to illumination provided to areas laterally adjacent to the target and provided by at least one LED different from LEDs in the selected cluster; and*
 - **72[m]:** *maintain a variance of illumination provided to the target relative to the laterally adjacent areas, when subsequent data from one or more of the cameras indicates a change in position of the target relative to the motor vehicle, by repeating the determination of target location, selection of the cluster and variance to illumination provided to the target, relative to the laterally adjacent areas, based on the subsequent data.*

Claim 80

- **48[pre]:** *An illuminating device having automatic control of light provided to an illuminated area comprising:*
- **48[a]:** *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;*
- **48[b]:** *a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;*
- **48[c]:** *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;*
- **48[d]:** *one or more processors;*
- **48[e]:** *[1] one or more sensors, including one or more cameras, placed on the structure [2] for detecting coordinate-specific information about the illuminated area, [3] at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;*
- **48[f]:** *a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the LED controlling power electronic circuitry apparatus,*
- **48[g]:** *said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and*
- **48[h]:** *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:*
- Claims 80[pre]-80[h] are nearly identical to claims 48[pre]-48[h]. See Appendix A. Therefore, Claims 80[pre]-80[h] are disclosed by Alden for the reasons above. See *supra* Claims 48[pre]-48[h].
- **80[i]:** *identify, based on data received from one or more of the sensors, a plurality of positions associated with the target as the target moves relative to the motor vehicle; and*
- **80[j]:** *change, responsive to the positions associated with the target, first light associated with one or more LEDs aimed toward at least a portion of the target, relative to second light associated with other one or more of the LEDs aimed laterally adjacent the target on either side, as the target moves relative to the motor vehicle.*