

Volkswagen Group of America, Inc. & Porsche Cars North America, Inc.
v.
Yechezkal Evan Spero

IPR2023-00315, IPR2023-00318, IPR2023-01225, IPR2023-01296

U.S. Patent No. 9,955,551

VOLKSWAGEN
GROUP OF AMERICA

Petitioner's Demonstratives

VWGoA EX1070
VWGoA v. Spero
IPR2023-00318

Agenda

- Technology Background
- The Karlsson Grounds Render Obvious All Claims
- The Beam Grounds Render Obvious All Claims
- Secondary Considerations Do Not Support Nonobviousness
- Dr. Turk's Testimony Should Be Excluded

Instituted Grounds

IPR2023-00315 & IPR2023-00318		
	Claim(s)	References
Ground 1	24 , 25, 30- 32 , 33, 38- 40 , 41, 46- 48 , 49, 54- 56 , 57, 62- 64 , 65, 70- 72 , 73, 78- 80 , 81, 86, 87	Beam (EX1005) and Satonaka (EX1014)
Ground 2 (Road Curvature Dependent Claims)	26-29, 34-37, 42-45, 50-53, 58-61, 66-69, 74-77, 82-85	Beam, Satonaka, and Kobayashi (EX1008)
Ground 3	24 , 25, 30- 32 , 33, 38- 40 , 41, 46- 48 , 49, 54- 56 , 57, 62- 64 , 65, 70- 72 , 73, 78- 80 , 81, 86, 87	Karlsson (EX1010) and Nakamura (EX1013)
Ground 4 (Road Curvature Dependent Claims)	26-29, 34-37, 42-45, 50-53, 58-61, 66-69, 74-77, 82-85	Karlsson, Nakamura, and Gotou (EX1012)

State of the Art at the Time of the '551 Patent

Dr. Jiao explained the state of the art in EX1003, ¶¶47-62¹.

- “As early as the 1940s and 1950s, vehicles such as the Tucker Torpedo and Citroen DS-19 included headlamps that swiveled with the turning angle of the wheels via mechanical linkage. EX1030, NHTSA Survey, 3-4.” EX1003, ¶51.
- “Most notably with relation to the technology claimed in the '551 patent, from about 1992 to 1999, a global consortium of headlamp and automobile manufacturers participated in the EUREKA Project to advance development of adaptive front lighting systems (AFS).... The EUREKA Project investigated, studied, and recommended AFS functions, including dynamic road illumination, glare control, explored reflectance of pedestrians and road signs, and other headlamp features. ... EX1015, 4.” EX1003, ¶51.
- “Adaptive lighting to reduce glare in a portion of an oncoming or following driver’s field-of-view was also well known. In 1999, a POSA in the industry understood that the beam pattern in AFS systems could be adapted for different driving, weather, and environment conditions, and to keep glare at a lower level when meeting or following other vehicles on the road. EX1023, 514-515.” EX1003, ¶56.

¹ Disclosure shared by exhibits in both proceedings cites only to the shared exhibit number and location in the shared exhibit.

Prior Art Examples of Adaptive Beam Patterns

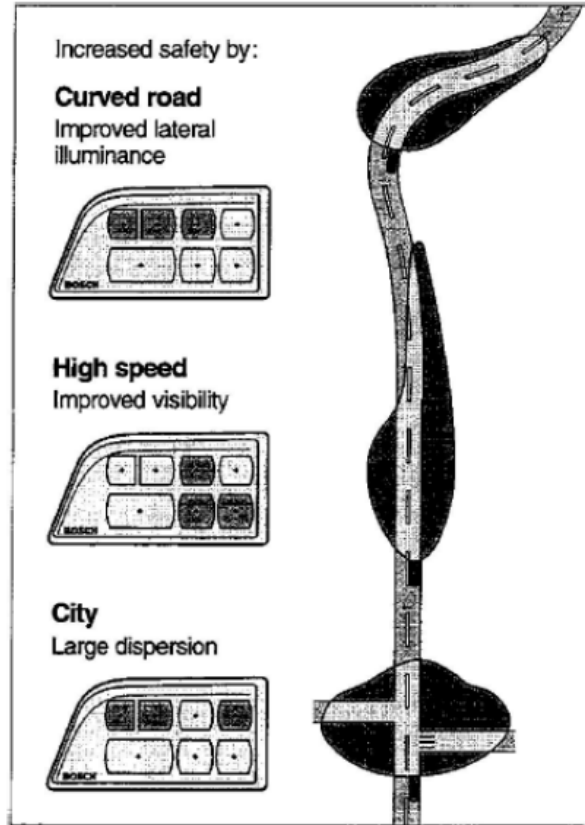


Fig.1: Three standard driving situations with adapted light pattern seen from the bird eye's view.

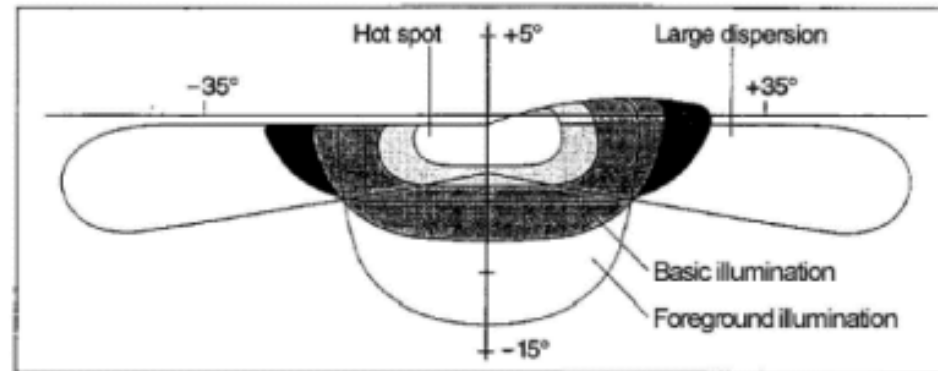


Fig. 3: Light pattern of multiple beam headlamp (Isolux curves in wall projection): The individual light pattern of multiple sub-units sum up to the total adaptive light pattern

EX1017, FIGS. 1 & 3.

'551 Patent – Independent Claim 24

Issued Claim 24	U.S. Pat. No. 9,955,551
24.P	An illuminating device having automatic control of light provided to an illuminated area comprising:
24.1	a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;
24.2	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;
24.3	electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;
24.4	one or more processors;
24.5	one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

Issued Claim 24	U.S. Pat. No. 9,955,551
24.6	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, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and
24.7	memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:
24.8	determine coordinates corresponding to another vehicle, based on the coordinate-specific information;
24.9	select a cluster of the LEDs that emit light toward at least a portion of the other vehicle based on the LEDs having emission aimings associated with the first coordinates; and
24.10	change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the cluster to create headlamp illumination that preserves a first level of illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle.

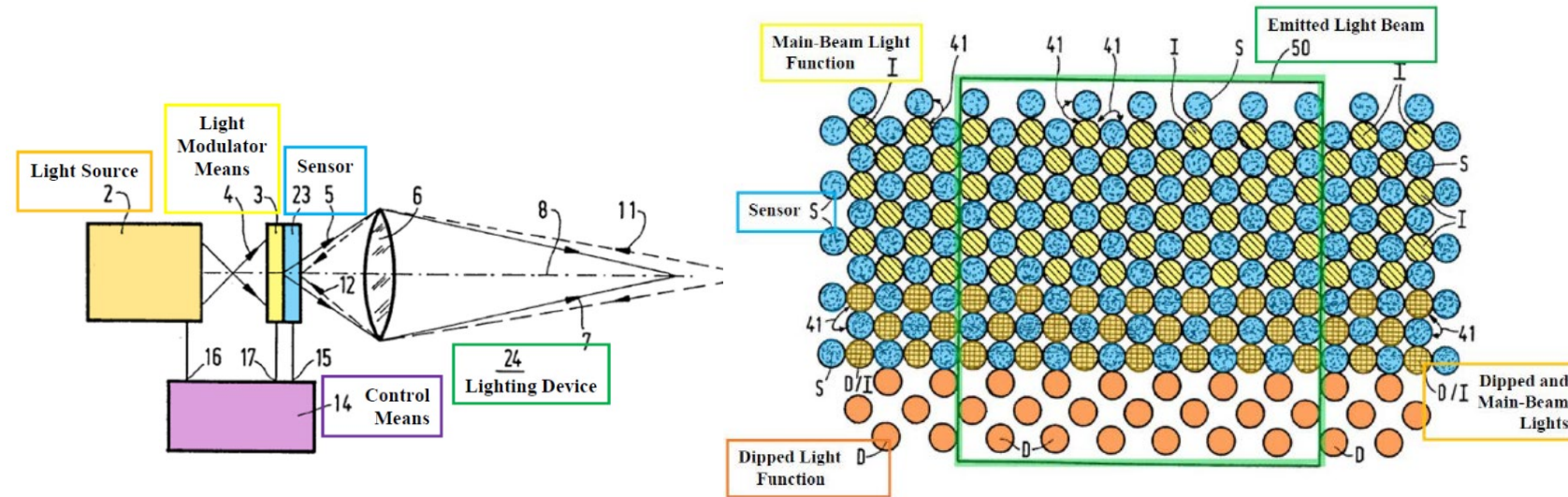
The '551 Patent Does Not Advance New Headlamp Technology

area to be illuminated. This invention comprises a different approach which is to provide the end user with the most correct lighting solution not a new technology lamp to replace the old one. The present invention comprises a novel

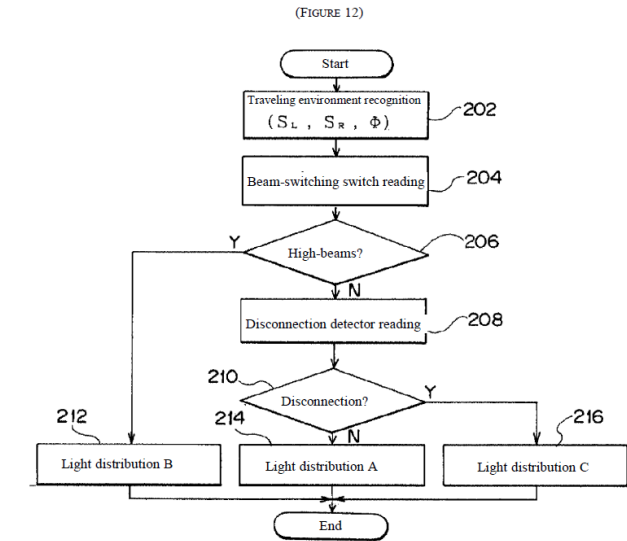
'551 Patent, EX1001, 11:5-8.

Ground 3 – Karlsson and Nakamura

- Karlsson discloses all of the structural elements of the independent claims.



Karlsson, EX1010, FIGs. 3, 14 (annotated).

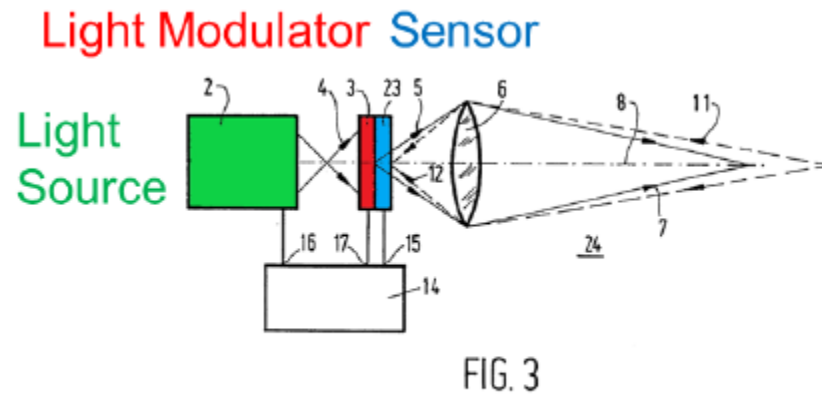


Nakamura, EX1013, FIG. 12.

Ground 3: Karlsson's Headlamps Include LEDs, an SLM, and a Camera

Dr. Turk agrees that Karlsson Figure 3 discloses a camera. EX2024, ¶176.

176. The alternative embodiments notably rely on different sensors: a “matrix of photo diodes or in the case of a light-sensitive sensor 23, a photo-sensitive plate as used in modern video cameras.” (Ex. 1010, 12:22-24.) Only the light modulator embodiment includes a camera. Karlsson illustrates the light-sensitive sensor 23 adjacent to the light modulator 3 in Figures 3, 5a, 7, 10.



(Ex. 1010, Fig. 3; Petition at 67, Annotated.)

Second Turk Dec., -318 EX2024, ¶165;
see also -315 EX2006, ¶160.

The lighting means in the lighting device according to the invention may be composed of a plurality of light sources and/or light modulators which are known per se in practice. Examples of light sources are, inter alia, filament lamps, gas discharge lamps, halogen lamps or Light Emitting Diodes (LEDs).

Karlsson, EX1010, 21:13-18 (annotated).

Dr. Turk agrees that Karlsson Figure 3 discloses a camera and light source

Q. And so that's -- so in Figure 3, Reference Number 23 is the light sensitive sensor beams. Correct?

A. I believe so.

Q. Okay. And Figure 3 has Light Source 2. Correct?

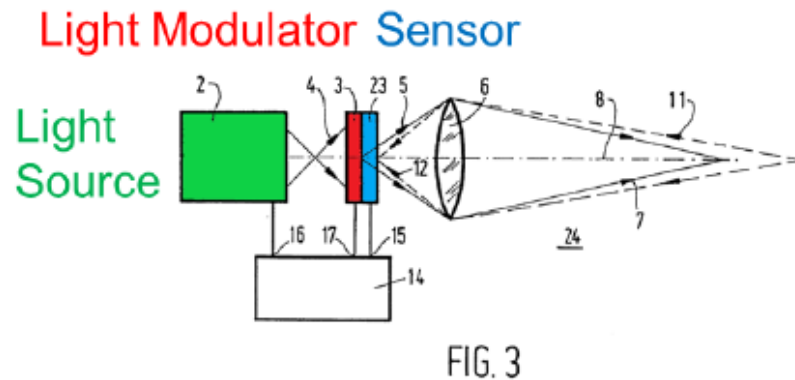
A. That's correct.

EX1053, 37:9-19, 38:9-19.

Ground 3: Karlsson's Headlamps Include LEDs, an SLM, and a Camera

Dr. Turk agrees that Karlsson Figure 3 discloses a camera. EX2024, ¶176.

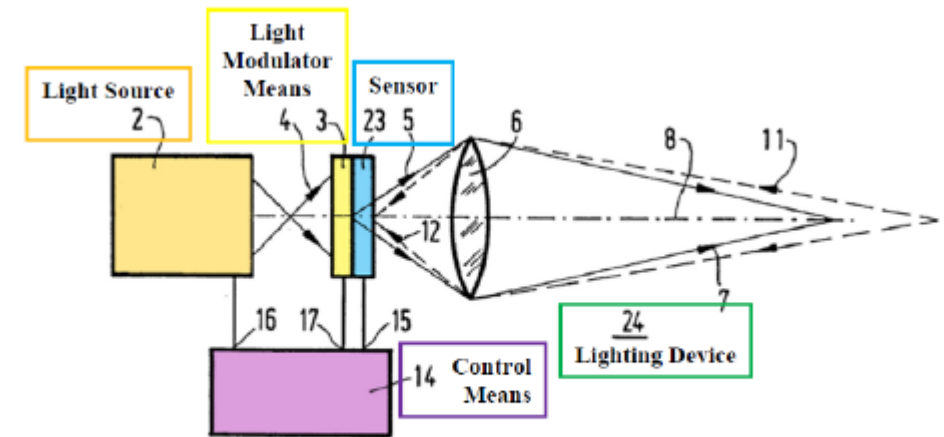
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Second Turk Dec., -318 EX2024, ¶165;
see also -315 EX2006, ¶160.

The Petition and Dr. Jiao applied Figure 3.



-315 Pet., 59; see also *id.*, 58, 60, 68-69, 71-72;
-318 Pet., 57; see also *id.*, 56, 58, 66-67, 69-70;
-315 EX1052, ¶¶147-151;
-318 EX1052, ¶¶132-136.

Claim 64: Karlsson Implements First/Second Clusters of LEDs in its Headlamps (-318 IPR only)

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;

Claim 64 (relevant portion)

In order to accomplish that objective the lighting device according to the invention comprises control means for intermittently, repeatedly controlling the intensity of the light emitted by the lighting means in a manner which is not visible to the human eye,

The use of spotlight sensors makes it possible to determine precisely the direction from which light is being detected, so that subsequently a precise adjustment of the pattern of the light beam can be carried out, for example so as not to emit light in the direction of the detected light.

Karlsson, EX1010, 2:36-3:7, 5:29-32.

Claim 64: Karlsson Implements First/Second Clusters of LEDs in its Headlamps (-318 IPR only)

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;

Claim 64 (relevant portion)

vehicle.” EX1035, 10:24-29. In my First Declaration, I addressed this element by pointing out that Karlsson would select additional, different clusters to address multiple vehicles. EX1003, ¶¶298-300. My explanation remains correct because this language does not restrict the second cluster to a single vehicle, and a second vehicle would have a different spatial position, thus requiring different LEDs to be selected for the second cluster. EX1003, ¶¶298-300.

Second Jiao Declaration, -318 EX1052, ¶138.

Claims 72/80: Karlsson's Headlamps Determine the Change/Plurality of Positions (-318 IPR only)

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,

Claim 72 (relevant portion)

identify, based on data received from one or more of the sensors, a plurality of positions associated with the target as the target move relative to the motor vehicle; and

Claim 80 (relevant portion)

In order to accomplish that objective the lighting device according to the invention comprises control means for intermittently, repeatedly controlling the intensity of the light emitted by the lighting means in a manner which is not visible to the human eye,

The use of spotlight sensors makes it possible to determine precisely the direction from which light is being detected, so that subsequently a precise adjustment of the pattern of the light beam can be carried out, for example so as not to emit light in the direction of the detected light.

The emitted light beam 50 is represented as a window which can shift in the plane of the drawings from the left to the right and from the top to the bottom, if desired, and vice versa, and which may vary as regards its shape and dimension in dependence on the desired pattern and direction of the beam.

Karlsson, EX1010, 2:36-3:7, 5:29-32; 19:29-33, FIG. 14.

Claims 72/80: Karlsson's Headlamps Determine the Change/Plurality of Positions (-318 IPR only)

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,

Claim 72 (relevant portion)

identify, based on data received from one or more of the sensors, a plurality of positions associated with the target as the target move relative to the motor vehicle; and

Claim 80 (relevant portion)

143. I disagree with Dr. Turk's reasoning regarding claims 72 and 80

because it is based on a misunderstanding of the claim language. First, the plain language of the relevant portions of claims 72 and 80 do not require some type of memory that stores a change in target positions, or in the case of claim 80 requires storing the plurality of positions. Claim 72 recites, in relevant part, "maintain a

144. As I explained in my First Declaration, Karlsson clearly discloses this

feature because it discloses "'repeatedly controlling the intensity of the light

emitted' to minimize glare. EX1010, 2:30-3:6. A POSA would have understood

that Karlsson's system updating its detected location to account for any vehicle

movement based on the new sensor data and, therefore, following any target

vehicle." EX1003, ¶335. I also explained that a "POSA would have understood

Second Jiao Dec., -318 EX1052, ¶¶143-144.

Karlsson Controls Its Headlamp Using Its Camera's Image Data (Dependent Claims 33, 41, 49, 57, 65, 73, 81) (-318 IPR only)

light 11. They may for example be comprised of a matrix of photo diodes or in the case of a light-sensitive sensor 23, a photo-sensitive plate as used in modern video cameras.

The control means 14 are arranged to selectively switch the individual small light sources, or a group of individual small light sources, on and off, or to selectively adjust the light intensity of a respective spotlight beam 34, in response to a control signal from sensor means 23, so as to provide a desired lighting pattern. In this respect, one may speak about

Karlsson, EX1010, 12:22-24, 14:26-33.

Q. What are -- what's your understanding of the term "image data" in Claim 33?

A. In general, I think it refers to data coming from a camera that creates images.

Dr. Turk's Deposition, EX1053, 77:13-20.

150. My First Declaration, which I understand is cited in the Petition, addressed the image data claim term. EX1003, ¶ 254. I state that "sensor 23 is connected to the power source to enable Karlsson's system to receive sensor data" and that "Karlsson also discloses that 'control means 14 are arranged to selectively switch the individual small light sources, or a group of individual small light sources, on and off...in response to a control signal from sensor means 23.'" EX1003, ¶254 (citing EX1010, 14:22-30). Further, I explain that "Karlsson's control means 14, which includes the processor, is in communication with sensor 23 to receive the control signal." EX1003, ¶254. I also explained that "the processor in control means 14 is processing the information (data base on detected light 11) from the cameras in Karlsson." EX1003, ¶270. This means that the information from the camera in Karlsson is based on the detected light—namely that the data is image data.

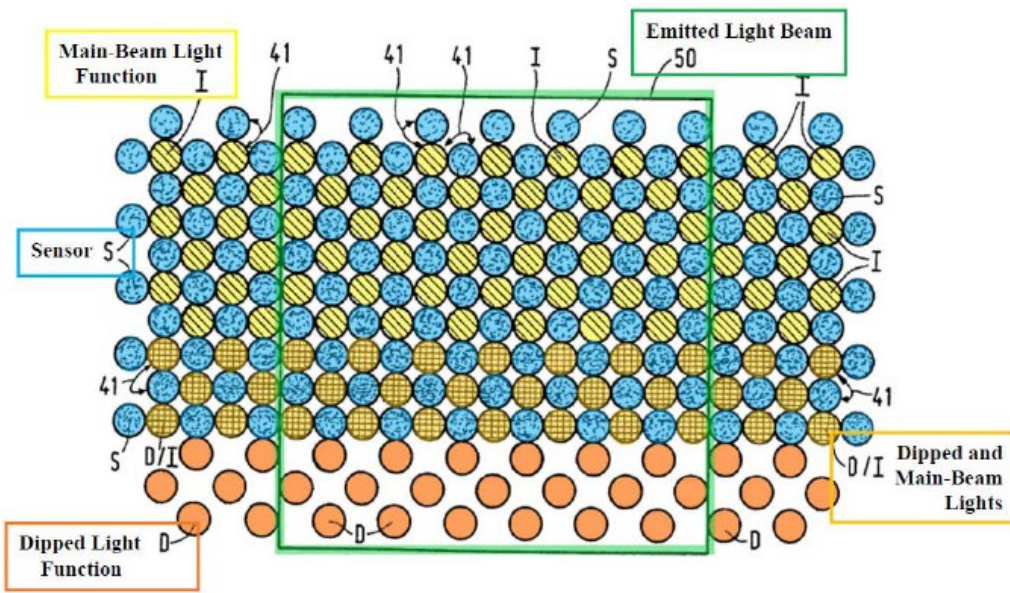
Second Jiao Dec., -318 EX1052, ¶150;
-315 EX1052, ¶160.

Karlsson and Gotou Render Obvious the Dependent Road Curvature Claims

Ground 4: Karlsson's Adaptive LED Array Does Not Default to "all LEDs on"

The emitted light beam 50 is represented as a window which can shift in the plane of the drawings from the left to the right and from the top to the bottom, if desired, and vice versa, and which may vary as regards its shape and dimension in dependence on the desired pattern and direction of the beam.

Karlsson, EX1010, 19:29-33.



Karlsson, EX1010, FIG. 14 (annotated).

A head lamp device for a vehicle in which a lighting region in front of the vehicle in a traveling direction can be adjusted in rightward and leftward directions comprises: a direction

Gotou, EX1012, Abstract.

FIG. 8

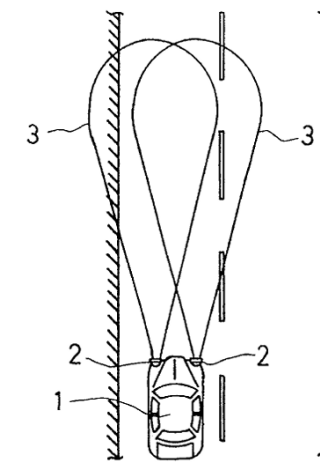
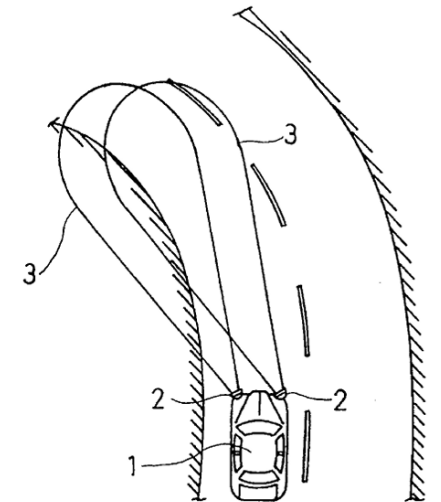


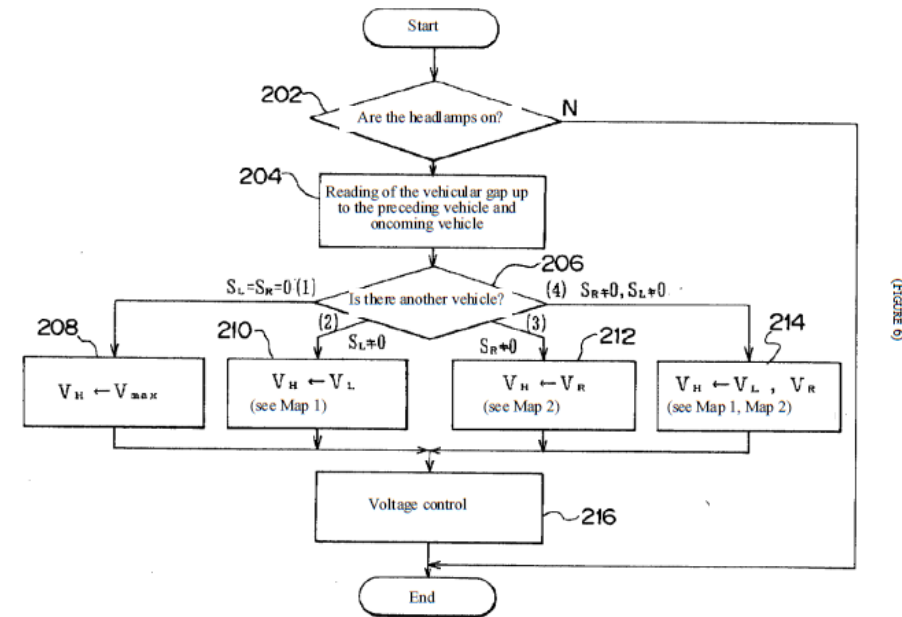
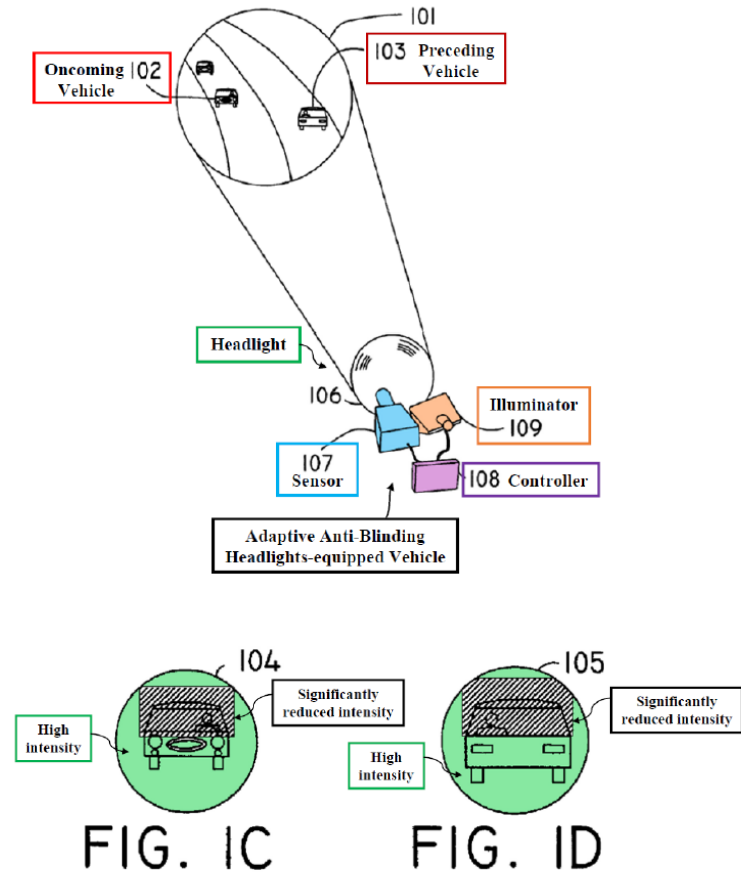
FIG. 9



Gotou, EX1012, FIGS. 8 & 9.

Ground 1 – Beam and Satonaka

- Patent Owner **does not dispute** that Beam discloses the structural elements of the independent claims.



Beam, EX1005, FIGS. 1, 1C, 1D (annotated).

Satonaka, EX1014, FIG. 6.

Beam's Headlamps Reduce/Decrease/Vary/Diminish Light (independent claims 24/32/40/56/72)

Patent Owner misinterprets these claims to exclude a change to zero or no illumination to reduce glare

change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the cluster.

Claim 24 (relevant portion) (example)

25. The illuminating device of claim 24, wherein: the changed emission includes a change to at least one of intensity or color or a change of at least one LED of the cluster to a non-emitting state;

Claim 25

70. First, Dr. Turk's argument regarding claim 24's "change emission" element is based on an incorrect opinion of how a POSA would understand this claim. A POSA would understand that the plain and ordinary meaning of the element "change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the cluster..." requires only a change in emission relative to another emission. The plain language of this claim element does not

71. In fact, I note that claim 25, which depends from claim 24, recites "the changed emission includes a change to at least one of intensity or color or a change of at least one LED of the cluster to a non-emitting state." EX1035, 1:65-67. Claim 25 therefore requires that the changed emission in claim 24 must include a non-emitting state, or turning the LED(s) off.

Second Jiao Dec., -315 EX1052, ¶¶70, 71.

Patent Owner's Understanding of Beam is Wrong (independent claims 24/32/40/56/72)

Beam does not require turning off its LEDs to prevent glare.

Beam uses intermediate (non-zero) light levels to avoid glare. EX1052,

¶¶77-79, 86, 91. Beam controls LEDs individually based on sensor data,

“determin[ing] which microbeams [LEDs] must be *reduced* in intensity to protect the other drivers.” *Id.*; EX1005, 4:16-19. Beam’s “illumination in the shaded area [is] *reduced significantly* to protect the vision of the oncoming drivers.” EX1005,

4:21-25; Pet., 28-32. Beam’s controller “uses the data [from sensor 107] to

determine the size and position of the light emitters to be *dimmed*.” EX1005, 5:13-

-315 Pet. Reply, 7; -318 Pet. Reply, 7.

Q. So what does “attenuation” mean in this context?

MS. SHAH: Objection. Asked and answered.

THE WITNESS: Generally, it means decreased.

EX1054, 95:6-23 (Dr. Turk acknowledging that Beam’s “attenuation” is a decrease of light).

EX1005, 5:13-15; EX1003, ¶¶133-134, 138. To a POSA, phrases in Beam such as “reduced in intensity,” “reduced significantly,” and “light emitters to be dimmed” mean a reduction in intensity that includes intermediate, reduced illumination values, not solely zero illumination.

Second Jiao Dec., -315 EX1052, ¶77.

Claim 48: The '551 Patent and Dr. Turk Admit That “Classifying” is Known

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 Recognition, statistical, structural and neural approaches.

'551 Patent, EX1001, 44:67-45:6.

- Q. Okay. But the '551 patent states here that the classifying techniques were known in the art. Correct?
- A. Yes, that's correct.

Dr. Turk's Deposition, EX1053, 84:21-85:3
(discussing EX1001, 44:67-45:9).

Claim 48: Patent Owner's Interpretation of "Classifying" is Wrong

illuminate a portion of at least one object, indicated by data from at least one of the one or more sensors, 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,

...

and the first light determined based at least in part on classifying the object based at least in part on the data;

Claim 48 (relevant portion)

Additionally, the Beam-Satonaka combination fails to teach the “*classifying the object*” limitation as both references teach a coarser level of control limited to light source detection, without any ability to distinguish between types of light sources—a necessary predicate for object classification. The proffered combination

Patent Owner's Argument, -315 POR, Paper p. 21.

Q. Thank you. What's your understanding of the plain and ordinary meaning of the term "classifying" there, the Claim 48?

A. To perform multi-class classification or recognition or determining the identity of an object.

Dr. Turk's Interpretation of Classifying, EX1053, 82:15-25.

Claim 48: Beam Discloses Either Interpretation of Classifying

The '551 patent does not define “classifying.” And the claim does not require specific objects be classified. EX1052, ¶¶92-98. A POSA would understand the plain language merely requires “placing the detected objects into categories or classes.” *Id.*, ¶96.

-315 Pet. Reply, p. 8.

Beam discloses the plain and ordinary meaning of “classifying” because its algorithm differentiates between illuminated objects that are above and below a threshold. EX1052, ¶¶97-98; Pet., 45; EX1003, ¶186. “The spatial scene data from sensor 107 is *thresholded* to eliminate weak signals and becomes the input to a processor 1105.” EX1005, 5:34-36. As Dr. Jiao explains, this means that objects

Beam discloses the correct interpretation. -315 Pet. Reply, 8.

specific information (the video data from the camera).” EX1003, ¶186. In Beam, “[t]he spatial scene data from sensor 107 is thresholded to eliminate weak signals and becomes the input to a processor 1105.” EX1005, 5:34-36. This means that objects detected by the sensor are separated into two classes: those that reflect or emit light above the threshold, and those that do not reflect or emit sufficient light. This meets the plain meaning of claim 48’s element “the first light determined based at least in part on classifying the object based at least in part on the data”

pattern, where the light is not dimmed. First, in my opinion a POSA would have understood that the thresholding I discuss above in Beam classifies objects even under Dr. Turk’s understanding of multi-class classification. Section VI.F.1; EX1005, 5:34-36. When Beam performs its thresholding function, it is separating

Second Jiao Dec., -315 EX1052, ¶¶97, 99.

Claim 64: Beam Implements First/Second Clusters of LEDs in its Headlamps (-318 IPR only)

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;

Claim 64 (relevant portion)

25 the vehicle equipped with the AABH system. As the positions of both vehicles move, the blanked area tracks the location of the oncoming vehicle, dynamically varying in position and in size. Multiple vehicles (light sources) are accommodated simultaneously by the system. In normal

Beam, EX1005, 6:24-27.

Beam's Headlamps Determine the Change/Plurality of Positions (claims 72 and 80) (-318 IPR only)

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,

Claim 72 (relevant portion)

identify, based on data received from one or more of the sensors, a plurality of positions associated with the target as the target move relative to the motor vehicle; and

Claim 80 (relevant portion)

sensor. Any microbeams that would blind the oncoming driver are diverted or attenuated at the source. Selection of the particular microbeams that form the dimmed area is performed continuously and dynamically (they would be adjusted based on input to the sensor, as opposed to older systems which shape the intensity profile of the beam following a presupposed distribution requirement.) The

25 the vehicle equipped with the AABH system. As the positions of both vehicles move, the blanked area tracks the location of the oncoming vehicle, dynamically varying in position and in size. Multiple vehicles (light sources) are accommodated simultaneously by the system. In normal

Beam, EX1005, 5:67-6:5, 6:24-27.

Beam's Headlamps Determine the Change/Plurality of Positions (claims 72 and 80) (-318 IPR only)

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,

Claim 72 (relevant portion)

identify, based on data received from one or more of the sensors, a plurality of positions associated with the target as the target move relative to the motor vehicle; and

Claim 80 (relevant portion)

88. I disagree with this reasoning because it is based on a misunderstanding of the claim language. First, the plain language of the relevant portions of claims 72 and 80 do not require some type of memory that stores a change target positions, or a plurality of positions. Claim 72 recites, in relevant in position and in size.” EX1005, 6:24-27; EX1003, ¶¶187, 197-198. Varying in position as disclosed in Beam results in a plurality of positions or change in position per the claim language here being identified by the system so that the non-glaring illumination can be modified to track the target (by varying in position). Thus, Beam discloses these portions of claims 72 and 80. EX1003, ¶¶187, 197-198.

Second Jiao Dec., -318 EX1052, ¶¶87, 90.

Beam Controls its Headlamp Using Its Camera's Image Data (dependent claims 33, 41, 49, 57, 65, 73, 81) (-318 IPR only)

Claim 32: follow, based at least in part on data from one or more of the cameras

Claim 33: the data includes image data

Claims 32 and 33 (relevant portions)

the scene come in through optical system **106**. Some of the rays are reflected by beamsplitter **201** to sensor **107**. They are imaged by the sensor and are converted to video or other electrical signals. The output drives controller **108**, which uses the data to determine the size and position of the light emitters to be dimmed. The output of the active emitters is

Beam, EX1005, 5:10-15.

Q. Okay. So the video or other electrical signals from the camera are used by the controller in Beam's controller 108. Correct?

A. I think so, yes.

Q. And you'd agree that the video or other electrical signals is image data. Correct?

A. Yes.

Dr. Turk's Deposition, EX1053, 81:14-20.

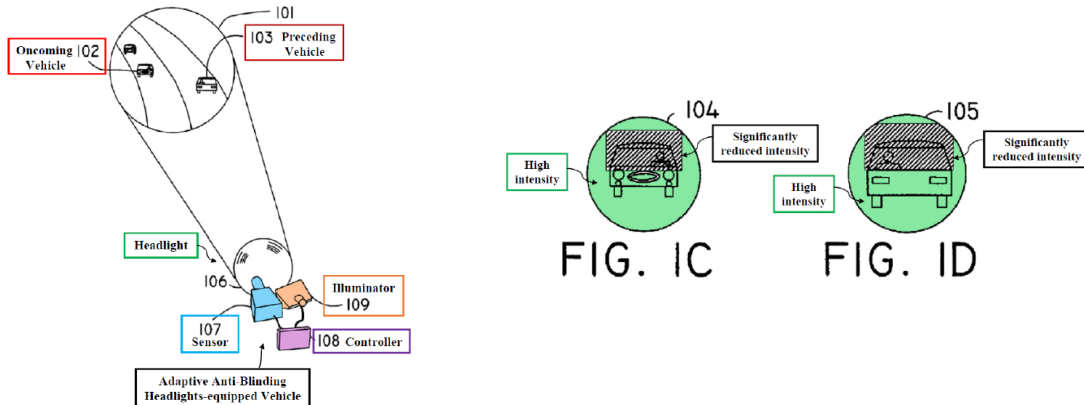
Beam & Karlsson Disclose the Dependent Non-Contiguous Claims²

Q. Okay. In Beam's system, the LEDs that are dimmed to correspond to those two shaded areas, they would not be contiguous. Correct?

And the two shaded areas being 1C and 1D, so the two different cars in the scene.

A. That's correct.

Q. I think that's correct, they would not be contiguous. At least in the way it appears to be shown here.



Turk Dep., EX1053, 100:3-101:5;
EX1005, FIGS. 1, 1C, 1D.

“the cluster includes non-contiguous LEDs”

Claim 25 (relevant portion)

Patent Owner does not dispute Petitioner's technical reasoning.

PO was not arguing that Petitioner's two groups of LEDs for dealing with two vehicles were not “non-contiguous” – PO was arguing that Petitioner's proof failed to address the claim language of claim 24 for all the LEDs it included in its multi-vehicle cluster. Any LEDs that Petitioner wants to include to define “the

-315 Sur-Reply, p. 20;
-318 Sur-Reply, pp. 14-15.

-315 Pet. Reply, pp. 11-12, 20; -318 Pet. Reply, pp. 11-12, 21; -315 EX1052, ¶¶105-108, 156-158; -318 EX1052, ¶¶92-96, 146-148; EX1035, 2:1-2.

²Claims 25, 27, 33, 35, 41, 43, 49, 51, 57, 59, 65, 67, 73, 75

Beam & Karlsson Disclose the Dependent Non-Contiguous Claims

The claims do not restrict clusters to a single vehicle.

Claim 24: select a cluster of the LEDs that emit light toward at least a portion of the other vehicle;

Claim 40: 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 the data indicating a second position associated with the second other vehicle

Example “cluster” claim language

tion. The concept cluster shown by the dashed lines, is used to describe a control function and is not necessarily related to contiguous placement. In general a cluster may be deemed a separate grouping due to a function it performs, either exclusively or in conjunction with other clusters or sub-clusters, such as high beam function versus a second cluster 278 which may provide a parking light function. The same

Clusters are broadly defined.
'551 Patent, EX1001, 53:30-31.

Beam & Karlsson Disclose the Dependent Non-Contiguous Claims

The claims do not restrict clusters to a single vehicle.

Claim 24: select a cluster of the LEDs that emit light toward at least a portion of the other vehicle;

Claim 40: 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 the data indicating a second position associated with the second other vehicle

Example “cluster” claim language

is “the cluster includes non-contiguous LEDs.” The plain language of this claim only requires that the cluster include LEDs that emit light toward at least a portion of the other vehicle. There is no restriction on the cluster having additional LEDs associated with a second vehicle. Further, I understand that these claims use the

Second Jiao Dec., -315 EX1052, ¶¶107-108;
-315 EX1052, ¶¶95-96.

Beam and Kobayashi Render Obvious the Dependent Road Curvature Claims

Patent Owner is Wrong about Beam's “Maximum Intensity” Statements

As Dr. Jiao explains, PO's and Dr. Turk's understanding of Beam is wrong.

EX1052, ¶122. Beam expressly states that the *angular position* or *attenuation* “of each of these microbeams is independently set by controller 108,” which is

controlled in a dynamic environment of moving vehicles. EX1005, 4:46-52;

EX1052, ¶¶114-120; EX1003, ¶70; Pet., 34, 37. Indeed, “Beam’s control is

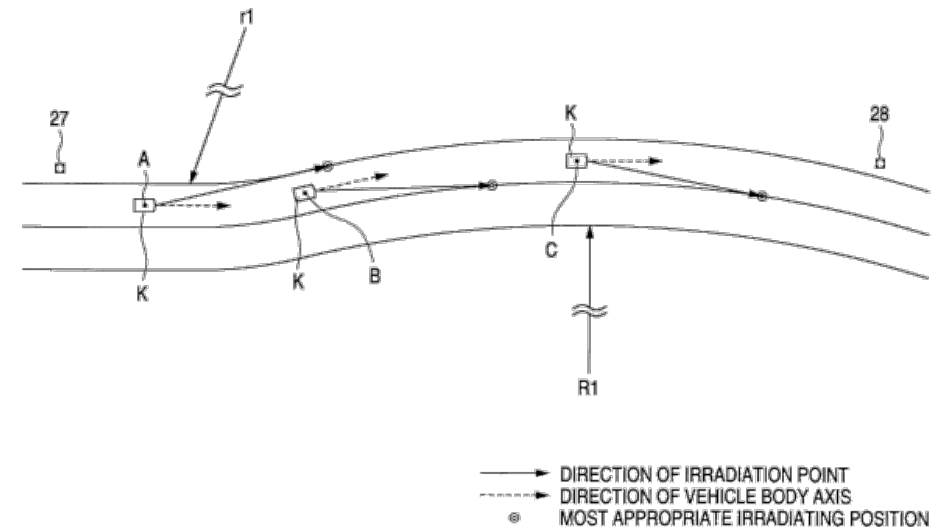
‘dynamically varying in position and in size,’ in response to the control input.”

EX1052, ¶124 (citing EX1005, 5:46-54, 6:24-27); *see also* Pet., 8, 10; EX1003,

¶¶70-78. Thus, Beam *does* disclose changing direction of microbeams to form its

-315 Pet. Reply, pp. 18;
-318 Pet. Reply, pp. 17-18.

A lighting device in which the vehicle advancing direction at which a driver aims is predicted, and the irradiating direction and irradiating range of a lighting device are controlled by comparing the result of the prediction to the information of the profile of a road on which the vehicle is running at present. The lighting device (1) includes a road



Kobayashi, EX1008, Abstract, FIG. 10.

Secondary Considerations Do Not Support Nonobviousness

Secondary Considerations Do Not Support Nonobviousness

- There is no nexus (no “unique features”).
- The alleged features have no correspondence with the evidence.
- Omission of corresponding features forfeits some claims in the -315 IPR and all claims in the -318 IPR.

-315 Pet. Reply, 25-27;
-318 Pet. Reply, 25-27.

Secondary Considerations: There is no Nexus

Dr. Turk does not independently analyze PO's secondary consideration evidence; he merely adopts opinions of a third party that is not available for cross-examination here. EX1053, 124:5-137:16. Nonetheless, PO fails to show any nexus. Because PO has no product corresponding to the claims (POR, 70-71), secondary consideration evidence must be "the direct result of the unique characteristics of the claimed invention." *Fox Factory, Inc. v. Sram, LLC*, 944 F.3d

-315 Pet. Reply, 25.

First, PO's three alleged unique characteristics are directed at only some claims, waiving their nexus arguments for all other claims (24, 25, 32-33, 38-39). POR, 70-71.

Second, the features PO identifies fail to show nexus because they are not unique. EX1052, ¶¶186-195. PO never disputes that Kobayashi and Gotou teach the "Predictive Curve Illumination" feature. *Id.*, ¶189. PO's argument against the relevant claims addresses elements unrelated to the "Predictive Curve Illumination" feature. *Id.*; Sections VIII, XII.

For the "light in-between" feature, PO also fails to show nexus. Claim 40 was known in the art. Indeed, PO never challenges the corresponding feature of claim 40, and as Dr. Jiao explains, this feature is taught at least by Beam and Karlsson. EX1052, ¶192; EX1005, FIG. 1.

Finally, for the "classifying" feature (claim 48), PO does not dispute that Karlsson discloses this element, and PO's argument against Beam is wrong.

-315 Pet. Reply, 26.

Secondary Considerations: The Evidence Does Not Correspond With the Claims

nexus. Because PO has no product corresponding to the claims (POR, 70-71), secondary consideration evidence must be “the direct result of the unique characteristics of the claimed invention.” *Fox Factory, Inc. v. Sram, LLC*, 944 F.3d

-315 Pet. Reply, 25-26.

PO did not address secondary considerations in their Sur-Reply.

B. PO’s evidence is not the direct result of the alleged unique characteristics.

For example, regarding Predictive Curve Illumination, PO cites an article that mentions “provid[ing] visibility for upcoming curves.” POR, 71 (citing EX2023, 727). But this is much broader than the claimed feature, allegedly represented by claim 26’s “accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the at least one headlamps.” EX1035, 2:9-11; EX1052, ¶196. Regarding the “light in-between” feature, PO does not explain what claim language is allegedly applicable—without that, PO cannot show any tie to its proffered evidence. Finally, regarding the “classifying” feature, PO cites “‘intelligent lighting’ technology to recognize cars that are being followed as well as oncoming traffic. (Ex. 2023 at 729-734)” POR, 71. But, claim 48 recites “the first light determined based at least in part on classifying the object based at least in part on the data,” which says nothing about recognizing preceding and oncoming cars. EX1035, 6:63-65; EX1052, ¶196. Thus, even if these alleged

-315 Pet. Reply, 26-27.

-318 IPR: Patent Owner Did Not Identify Any Claims With Unique Characteristics

A. PO's waives any nexus argument because PO does not address any claims in this proceeding.

PO identifies three alleged unique characteristics for nexus, but only links

these characteristics to claims that *are not at issue in this proceeding*: “claims 26-

29, 23-37, 42-45 and 50-53,” “claim 48,” and “claim 40.” POR, 71. PO does not

identify any claims in this proceeding that are linked to an alleged unique

characteristic, and thus PO cannot show nexus for any claim in this proceeding. Dr.

-318 Pet. Reply, 25.

PO did not address secondary considerations in their Sur-Reply.

Motion to Exclude: Dr. Turk Is Not a POSA

Dr. Turk does not have “at least 2 years of industry experience **in the area of automotive lighting and lighting-control systems.**”

experience (Ex.1003, ¶45), dismissing the impact of Dr. Turk’s Ph.D., sensing experience, and three years of experience designing an autonomous vehicle system where vehicle lighting and lighting control systems played “an important part.” (Ex.1054, 54:7-8.) Under the Petition’s *full* POSA definition, Dr. Turk is unquestionably a POSA.

Patent Owner’s Argument, -315 Sur-Reply, pp. 1-2.

Motion to Exclude: Dr. Turk Is Not a POSA

27. These incorrect statements and misunderstandings in Dr. Turk's declarations and depositions, along with the dearth of experience in the field reflected on his CV, convince me that he is not a POSA, and does not understand fundamentals in automotive lighting and lighting control with no knowledge of basic concepts, lighting principles, lighting metrics and measurements, lighting regulations and standards, which a POSA would have. The examples include the basic terms of "intensity," "brightness," high beam, low beam, and other automotive lighting devices and their well-defined functions and requirements, how those lighting devices are optically combined, and other basic and commonly used terms that a POSA would readily understand. He does not understand how a POSA would go about measuring such lighting quantities (e.g., in development or under certain regulations, EX1054, 103:22-108:14, 150:23-156:3), or what a POSA would have found obvious to combine with respect to the applied references

Jiao Second Dec., -315 EX1052, ¶27;
-318 EX1052, ¶27.

For example, when asked during the deposition for this proceeding whether a headlamp needs directional light sources to provide "adaptive headlamp functionality" (a term used by Dr. Turk in his second declaration here, EX2006, ¶35), Dr. Turk responded "I'm not sure if I've thought about this as a general question." EX1053, 31:23-32:2. Dr. Turk was also asked if a LED die is a directional light source, to which he responded "I hadn't really thought about that." *Id.*, 32:3-13. Puzzlingly, instead of personally conducting a "test" he described, the work was outsourced to some unknown person, Dr. Turk was "not at th[e] location" of the supposed test he purportedly "supervised," he did not believe he even spoke with the person who executed the test, and he did not consult any standards or regulations when formulating the test. *Id.*, 103:7-112:22.

-315 Pet. MTE, pp. 7-8;
-318 Pet. MTE, pp. 7-8.

Motion to Exclude: Dr. Turk Is Not a POSA

Dr. Turk does not have “at least 2 years of industry experience in the area of automotive lighting and lighting-control systems.”

Q. Did you personally work on the illumination portion of that project?

A. I did at times.

Q. And what did you specifically work on with regards to the illumination?

A. It was a long time ago and I don't remember too much detail about it, but certainly an important question was how much and what kind of illumination was necessary to be able to do what we needed to do.

1984-87

Martin Marietta Denver Aerospace

Denver, CO

Senior Engineer

Research in vision algorithm development and implementation for mobile robot navigation (DARPA Autonomous Land Vehicle program).

Turk CV, EX2002, pp. 3-4.

Turk Dep., EX1054, 54:9-15.

Motion to Exclude: Dr. Turk Is Not a POSA

Dr. Turk does not have “at least 2 years of industry experience in the area of automotive lighting and lighting-control systems.”

1984-87 Martin Marietta Denver Aerospace

Denver, CO

Senior Engineer

Research in vision algorithm development and implementation for mobile robot navigation (DARPA Autonomous Land Vehicle program).

Turk CV, EX2002, pp. 3-4.

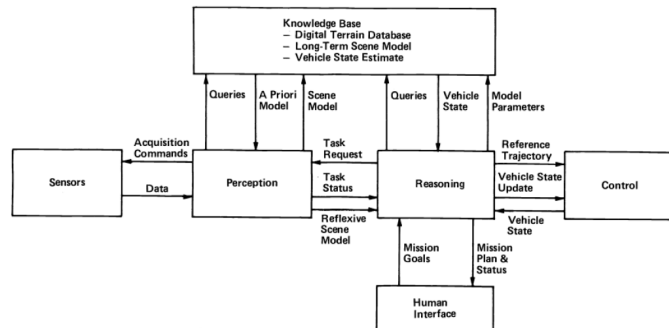
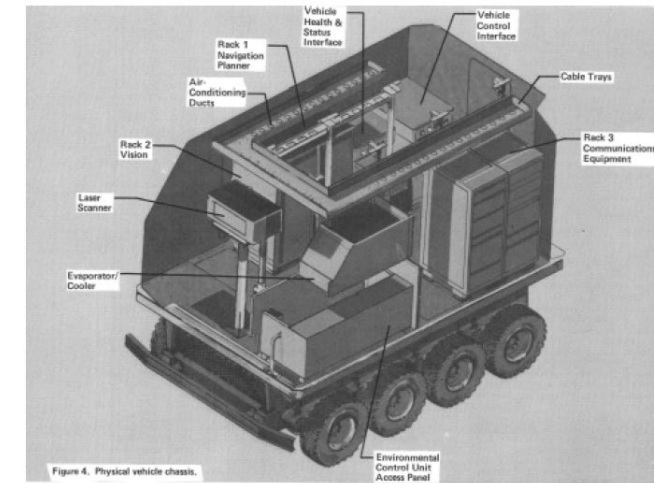


Figure 1. Long-range ALV system architecture.

EX1064, FIG. 1.

43. Indeed, a paper co-authored by Dr. Turk shows a figure of the project installed over “a drive chassis supplied by Standard Manufacturing,” and notes that “[t]his physical platform is considered to be sufficient to support the electronics for all projected demonstrations and experiments.” EX1064, 338.



EX1064, FIG. 4.

EX1052, ¶43.

Questions?

Appendix

Overview of Karlsson: Headlamps With Controllable LED Arrays

176. The alternative embodiments notably rely on different sensors: a “matrix of photo diodes or in the case of a light-sensitive sensor 23, a photo-sensitive plate as used in modern video cameras.” (Ex. 1010, 12:22-24.) Only the light modulator embodiment includes a camera. Karlsson illustrates the light-sensitive sensor 23 adjacent to the light modulator 3 in Figures 3, 5a, 7, 10.

Second Turk Dec., -318 EX2024, ¶176;
see also -315 EX2006, ¶173.

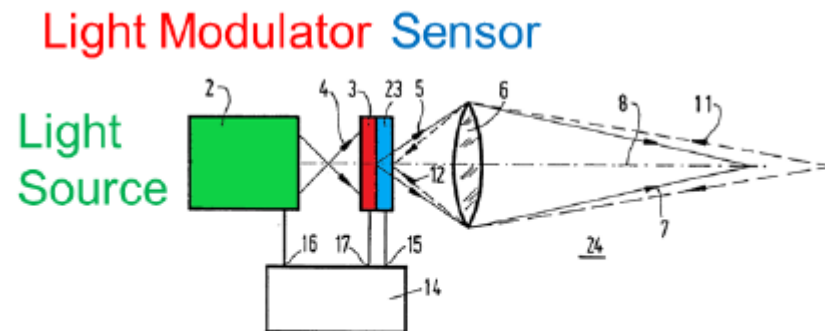


FIG. 3

(Ex. 1010, Fig. 3; Petition at 67, Annotated.)

Second Turk Dec., -318 EX2024, ¶165;
see also -315 EX2006, ¶160.

The lighting means in the lighting device according to the invention may be composed of a plurality of light sources and/or light modulators which are known per se in practice. Examples of light sources are, inter alia, filament lamps, gas discharge lamps, halogen lamps or Light Emitting Diodes (LEDs).

Karlsson, EX1010, 21:13-18 (annotated).

Overview of Karlsson: Coordinate Teachings

238. Karlsson's "sensors 9 and 23 are preferably designed to be capable of *precisely determining the direction and intensity of the detected light 11.*" EX1010, 12:19-22. "[T]he electric signal fed to the input 15 of the control means 14 by the light-sensitive sensor 9 is processed by the control means 14 into output signals...to control the lighting means." EX1010, 9:13-16. Thus, Karlsson discloses receiving an image and processing that to determine which area of the image contains a vehicle to control the headlights. In my opinion, a POSA would have understood that this *processing and storage involves the use of coordinate-specific information, and produces coordinates that correspond to the direction of the detected light sources.*

-315 EX1003, ¶238;
-318 EX1003, ¶242.

The external light sources are imaged on the light sensors 23 as light spots by the lens system 6. The horizontal position of the light spots determines which LCD segment 48 should be switched off, i.e. set to a non-transmissive state. Since the LCD segments 48 form

Karlsson, EX1010, 17:21-24.

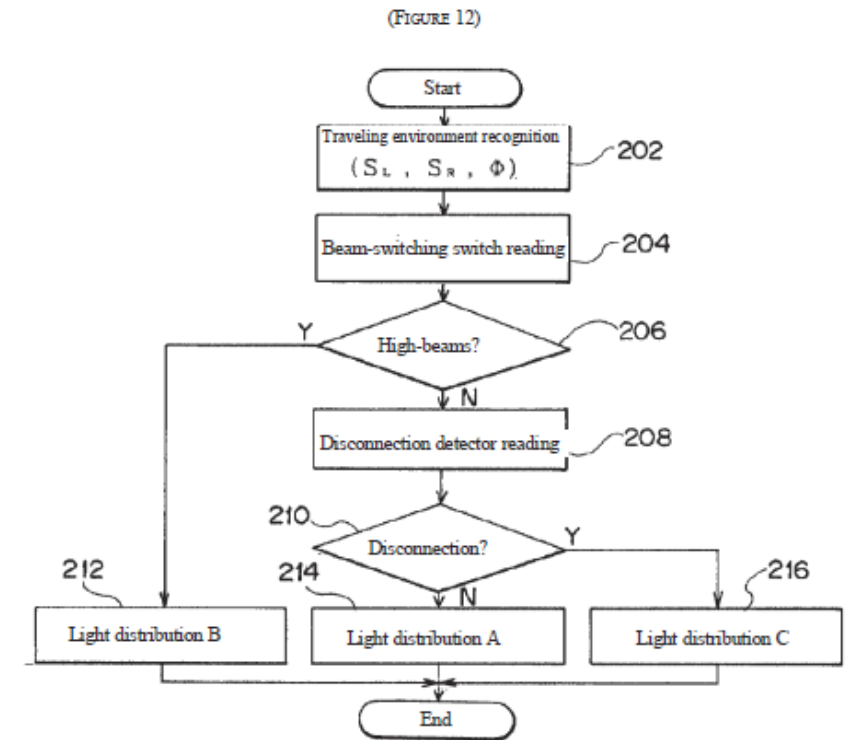
Overview of Nakamura: Coordinate Teachings

good driver visibility. The method of determining the driver's gaze position using image processing will be described briefly below. Each pixel of the image that is formed by the image signal identifies a position based on the coordinates (X_n, Y_n) in the coordinate system that may be determined based on the orthogonal X axis and Y axis that have been established on the image.

Nakamura, EX1013, ¶25.

248. If Patent Owner argues that Karlsson does not disclose producing and storing coordinates with its images, it would have been obvious to a POSA to modify Karlsson's system to include the coordinates of the pixels, and the corresponding vehicle recognition process as taught by Nakamura. This would have expressly provided the algorithm details that are already implicit in Karlsson's system, therefore allowing the coordinates of the traffic ahead to be

-315 EX1003, ¶235; -318 EX1003, ¶248.



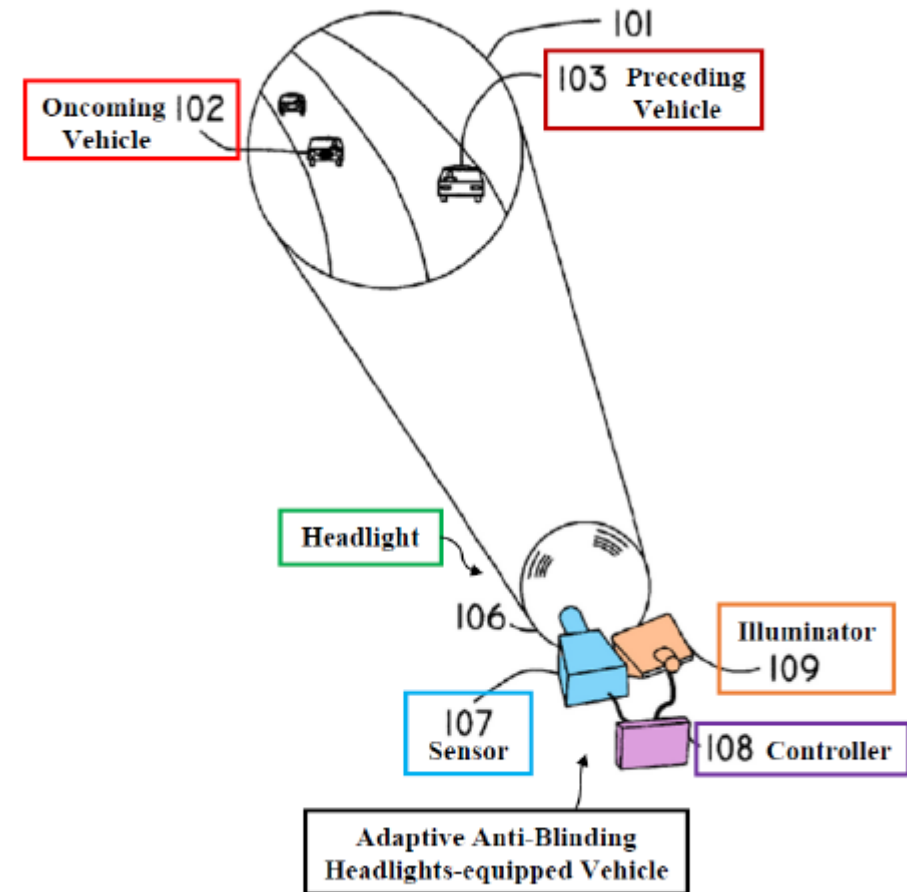
Nakamura, EX1013, FIG. 12.

Overview of Beam

This invention relates to the production of a beam of light comprised of many microbeams, controlled by incoming radiation, employing a sensor to determine the location of light sources forward of the apparatus and using that information to control the intensity, and/or the angular position, of one or more narrow-angle microbeams, which are part of a large number of beams comprising the overall output beam.

through beamsplitter 201 and out optical system 106. Thus we produce an overall beam pattern comprising many (in this embodiment, ~300 000) individual narrow-angle microbeams of light, as contrasted with conventional headlights, which produce only a single beam. These microbeams are arranged in an X-Y matrix. The angular position or attenuation of each of these microbeams is independently set by the controller 108. Controller 108 selectively commands

Beam, EX1005, Abstract, 4:41-48.

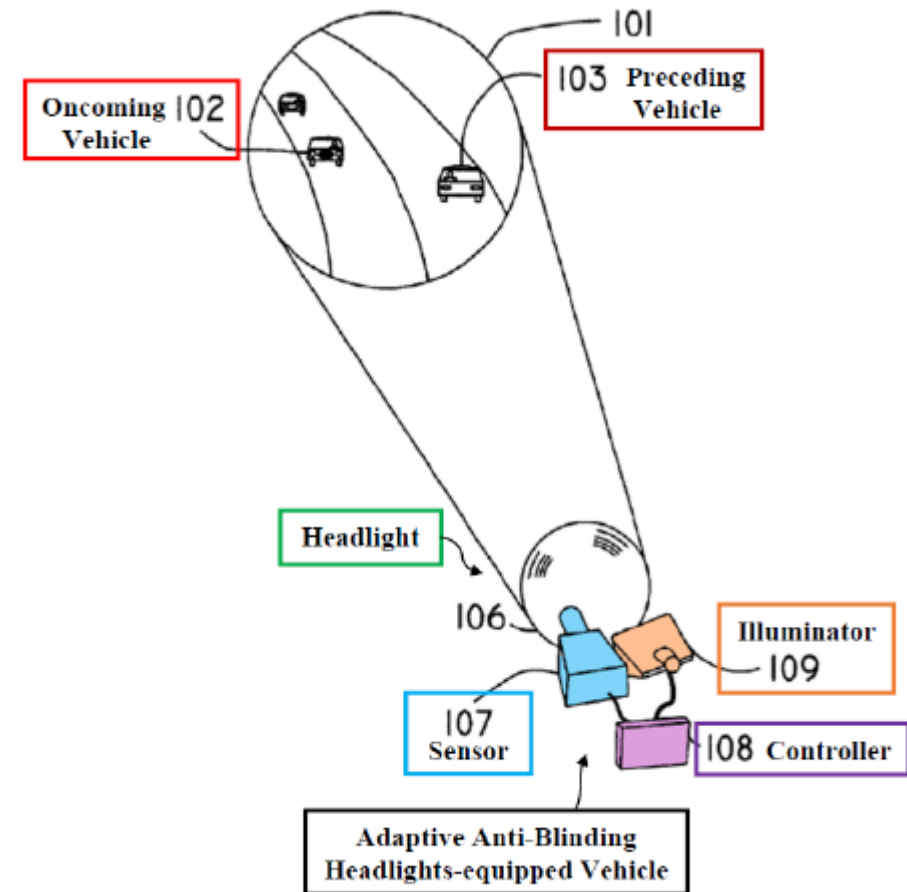


Beam, EX1005, FIG. 1 (annotated).

Overview of Beam

The instant invention solves all of the enumerated problems by automatically sensing the presence and location of headlights and taillights ahead of the car on which it is mounted. It will then control the light output of a group selected from a multiplicity of narrow angle beams (microbeams) which comprise the overall headlight beam pattern. By controlling an area determined by analyzing the

Beam, EX1005, 2:53-59.



Beam, EX1005, FIG. 1 (annotated).

Overview of Beam: Coordinate Teachings

processor 1105 via a bus 1112. Processor 1105 uses appropriate algorithms on the incoming data to determine the locations to be blanked, and stores them in memory 1106.

(b) determining the coordinates of said oncoming or followed vehicle in said area of illumination;

Beam, EX1005, 5:33-48, 8:27-28.

¶¶101-104; Section V.A. Beam's controller 108 receives an image from sensor 107 that is formed with pixels, and "uses appropriate algorithms on the incoming data to determine the [pixel] locations to be blanked, and stores them in memory 1106."

EX1005, 5:33-48. Beam further discloses "determining the coordinates of said

oncoming or followed vehicle." *Id.*, 8:27-28. Thus, Beam discloses receiving an

image in the form of an array of pixels, and processing those pixels to determine

coordinates of a target vehicle. *Id.*; EX1003, ¶104. Beam explains how each pixel is

-315 Pet., pp. 17-18.

Overview of Satonaka: Coordinate Teachings

(0025) Next, the recognition processing of other vehicles (preceding vehicles and oncoming vehicles) and computation processing of the vehicular gap in image processing apparatus 48 in this example of embodiment will be described. Each pixel of the image that is formed by the image signal identifies a position based on the coordinates (X_n , Y_n) in the coordinate system that may be determined based on the orthogonal X axis and Y axis that have been established on the image.

Satonaka, EX1014, ¶25.

other vehicle.” Satonaka describes how oncoming vehicles are detected within the coordinate frame of its image, and we conclude based on those disclosures that Satonaka satisfies the claim language. Ex. 1014 ¶¶ 30–34.

-315 Institution Decision, p. 12.

103. If Patent Owner argues that Beam does not explicitly disclose determining and storing coordinates, it would have been obvious to modify Beam to do so in view of Satonaka. Satonaka’s adaptive headlight system detects vehicles by processing an “image 120...that was obtained by camera 22.” EX1014, ¶26. “Each pixel ... identifies a position based on the *coordinates* (X_n , Y_n).” EX1014, ¶25. Satonaka details a multi-step algorithm by which the

-315 EX1003, ¶103; -318 EX1003, ¶105.

Motivation to Combine Beam/Satonaka and Karlsson/Nakamura

103. If Patent Owner argues that Beam does not explicitly disclose determining and storing coordinates, it would have been obvious to modify Beam to do so in view of Satonaka. Satonaka's adaptive headlight system detects vehicles by processing an "image 120...that was obtained by camera 22." EX1014, ¶26. "Each pixel ... identifies a position based on the *coordinates* (X_n , Y_n)." EX1014, ¶25. Satonaka details a multi-step algorithm by which the

-315 EX1003, ¶103; -318 EX1003, ¶105.

236. If Patent Owner argues that Karlsson does not disclose producing and storing coordinates with its images, it would have been obvious to a POSA to modify Karlsson's system to include the coordinates of the pixels, and the corresponding vehicle recognition process as taught by Nakamura. This would have expressly provided the algorithm details that are already implicit in Karlsson's system, therefore allowing the coordinates of the traffic ahead to be determined

-315 EX1003, ¶236; -318 EX1003, ¶244.

Motivation to Combine: Patent Owner's “Test” is Fatally Flawed

Motivation to Combine: Patent Owner's Argument is Premised on a Flawed "Test"

Patent Owner's "test" purports to show different camera perspectives.



Lower Left
Camera



Top Center
Camera



Lower Right
Camera

-315 POR, 37; -318 POR, 37.

Motivation to Combine: Patent Owner's "Test" is Fatally Flawed

Patent Owner's "test" was not designed or supervised by Patent Owner's declarant.

Dr. Turk was not present when the photos were taken, did not know who took the pictures, did not know details regarding the positioning or types of vehicles, and did not know details regarding the camera positioning. EX1052, ¶¶102-106; EX1053, 104:22-110:14. Further, Dr. Turk admitted that no standards or regulations were used for the test. EX1053, 110:10-14.

-315 Pet. Reply, 16, 20-21; -318 Pet. Reply, 15, 21-22.

No POSA would rely on this flawed test

be useful to make the points I wanted to look into." EX1053, 103:17-104:21. This is not how any POSA, let alone expert, would have set up a test of this type, and certainly not the type of test a POSA or expert would rely on to support any conclusions.

-315 EX1052, ¶121; -318 EX1052, ¶106.

Motivation to Combine: Patent Owner's Analysis is Also Flawed

Regardless of the flaws in the “test,” Patent Owner’s analysis is separately flawed.

PO’s bottom line argument is that after modification, Beam would perform worse because of the camera viewpoint change. POR, 26-40. But PO misunderstands that Beam’s camera viewpoints are not changed in the combination. EX1052, ¶¶128-129. Beam is modified with Satonaka’s teachings for

-315 Pet. Reply, 16; -318 Pet. Reply, 16.

camera viewpoints. EX1052, ¶¶129-130. PO’s bodily incorporation argument does not account for how a POSA would routinely adapt the algorithmic concepts to Beam’s viewpoint. EX1052, ¶130; *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398,

-315 Pet. Reply, 17; -318 Pet. Reply, 16.

PO’s argument also misunderstands how a POSA would modify Beam in view of Satonaka. POR, 36-37. A POSA would not directly copy Satonaka’s recognition window into Beam. EX1052, ¶¶113-118 (citing EX1005, 4:9-31; EX1014, ¶¶27-33). A POSA would instead preserve, rather than exclude, Beam’s ability to find *all* targets in the illuminated field of view for glare reduction, as both Beam and Satonaka teach. *Id.*; EX1005, 4:9-31; EX1014, ¶¶27-33.

-315 Pet. Reply, 17-18; -318 Pet. Reply, 17.

Beam's Headlamps Have Optical Control Elements (dependent claims 30, 31, 38, 39, 46, 47, 54, and 55)

PO's argument is flawed for at least two reasons. POR, 24-26. First, PO is incorrect that Beam does not disclose a spatial light modulator with LEDs. Pet., 39; EX1003, ¶¶151-152. Beam specifically states that these elements are present in the same device. EX1005, 8:4-12; EX1052, ¶¶50-56, 109-111. PO does not otherwise argue that an SLM is not an optical control element. POR, 24-26; EX1052, ¶¶109-110.

-315 Pet. Reply, 12.

4. The anti-blinding illumination system as set forth in claim 1 wherein said light source includes an array of individual, independently controllable microbeam sources selected from the group consisting of light-emitting diodes, lasers, incandescent lamps, arc lamps and electroluminescent lamps, and a spatial light modulator selected from the group consisting of digital mirror devices, liquid crystal devices, and grating light valves for selectively controlling the intensity of individual microbeam sources in said array.

- Q. Claim 4 recites, "Said light source includes an array of individual independently controllable microbeam sources," correct?
- A. Yes.
- Q. And claim 4 recites that those microbeam sources can be light-emitting diodes, correct?
- A. It says that, yes.
- Q. Claim 4 also recites a spatial light modulator, correct?
- A. Yes.

Beam, EX1005, Claim 4;
Turk Depo., EX1054, 89:13-90:1.

Beam's Headlamps Have Optical Control Elements (dependent claims 30, 31, 38, 39, 46, 47, 54, and 55)

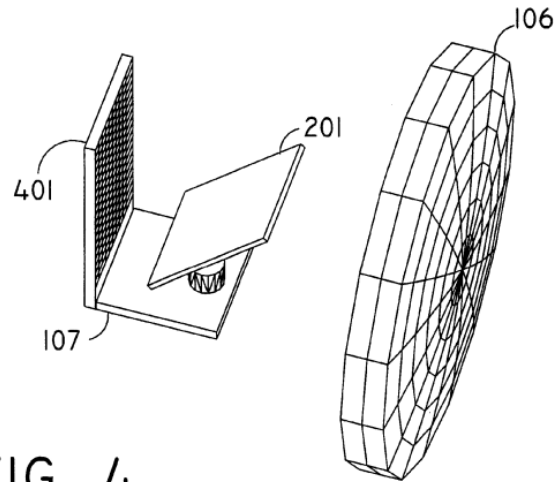


FIG. 4

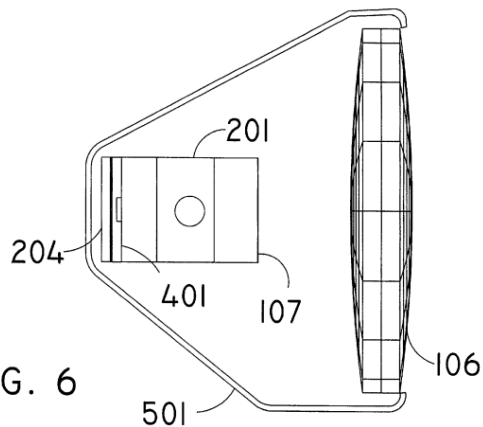


FIG. 6

Second, Beam's optical control system 106 includes "reflectors and lenses

[that] can control the light from at least one of the microbeams (e.g., emanating

from its LEDs)." Pet., 39 (citing EX1005, 5:17-21). A POSA would have

understood this is accurate, and PO does not present technical arguments

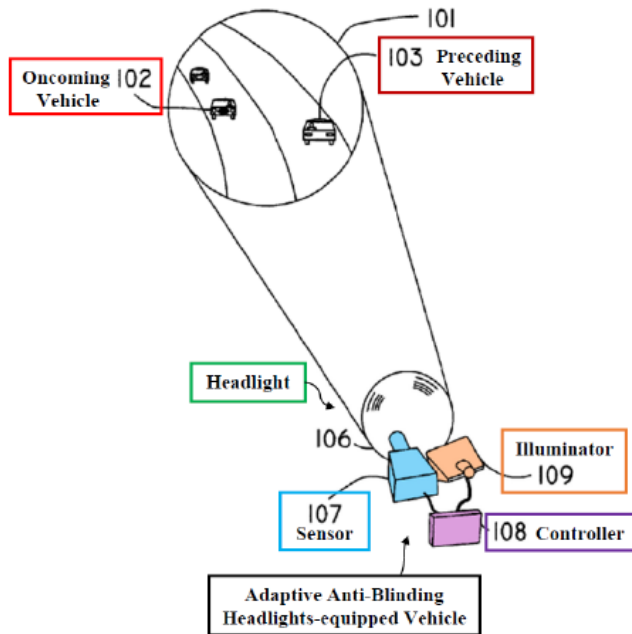
otherwise. EX1052, ¶111.

-315 Pet. Reply, 12.

Beam, EX1005, FIGS. 4 & 6.

Grounds 1 & 3: Beam and Karlsson Disclose a Camera Positioned to Capture an Image of a Headlamp Target

Claim 32: Beam and Karlsson Have Cameras That Capture an Image of the Target



to be emitted. In the preferred embodiment of the invention, the light-sensitive sensors 9 and 23 are preferably designed to be capable of precisely determining the direction and the intensity of the detected light 11. They may for example be comprised of a matrix of photo diodes or in the case of a light-sensitive sensor 23, a photo-sensitive plate as used in modern video cameras.

Karlsson, EX1010, 12:19-24.

maximum intensity at all times. An imaging sensor (such as a video camera) faces forward, boresighted with the headlight. The output of the sensor is connected to the controller.

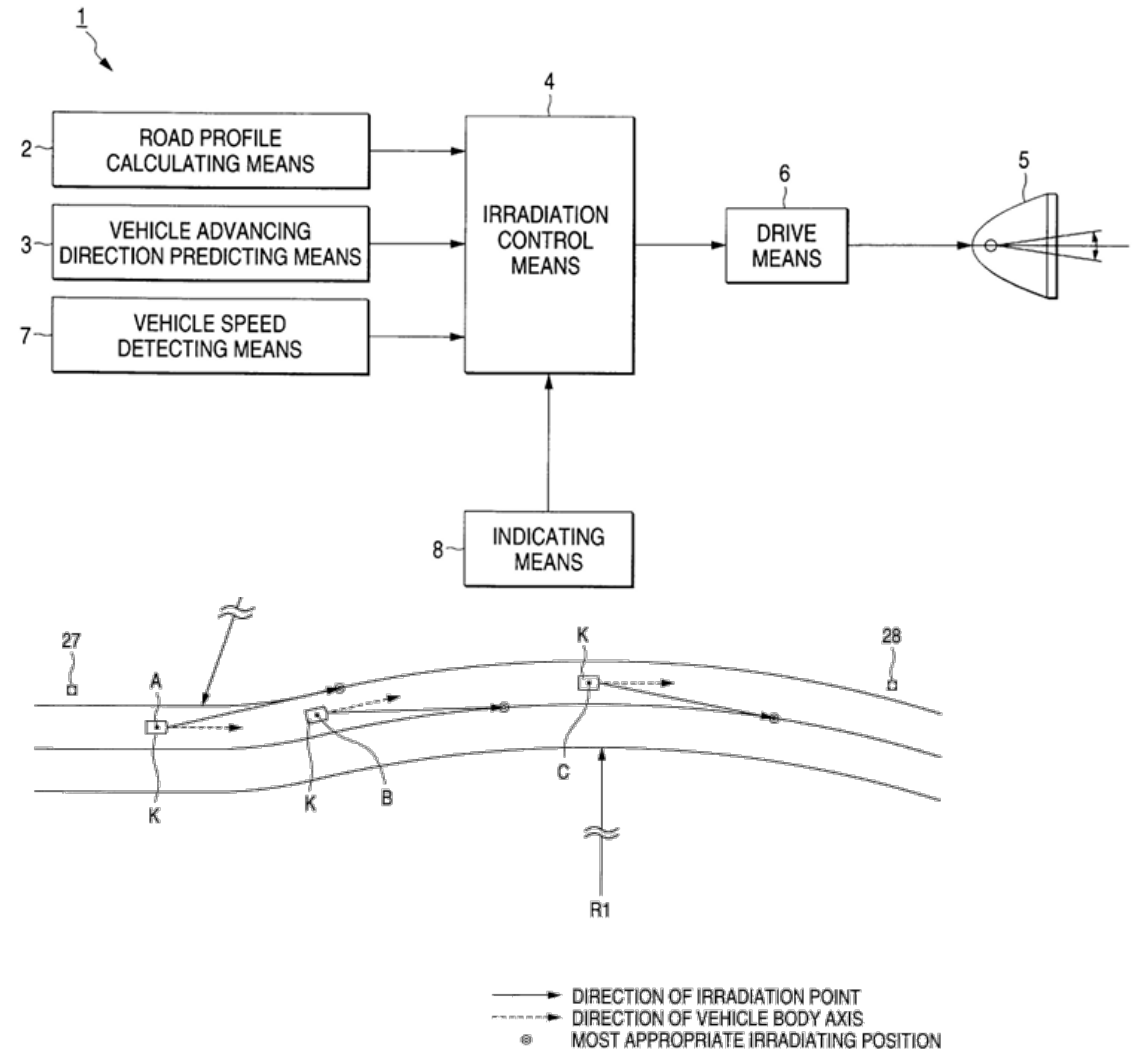
Beam, EX1005, FIG. 1 (annotated), 6:12-14.

Grounds 2 & 4 (Road Curvature Claims): Beam and Karlsson Do Not Default to Maximum Intensity

Ground 2: Overview of Kobayashi

A lighting device in which the vehicle advancing direction at which a driver aims is predicted, and the irradiating direction and irradiating range of a lighting device are controlled by comparing the result of the prediction to the information of the profile of a road on which the vehicle is running at present. The lighting device (1) includes a road

Kobayashi, EX1008, Abstract.

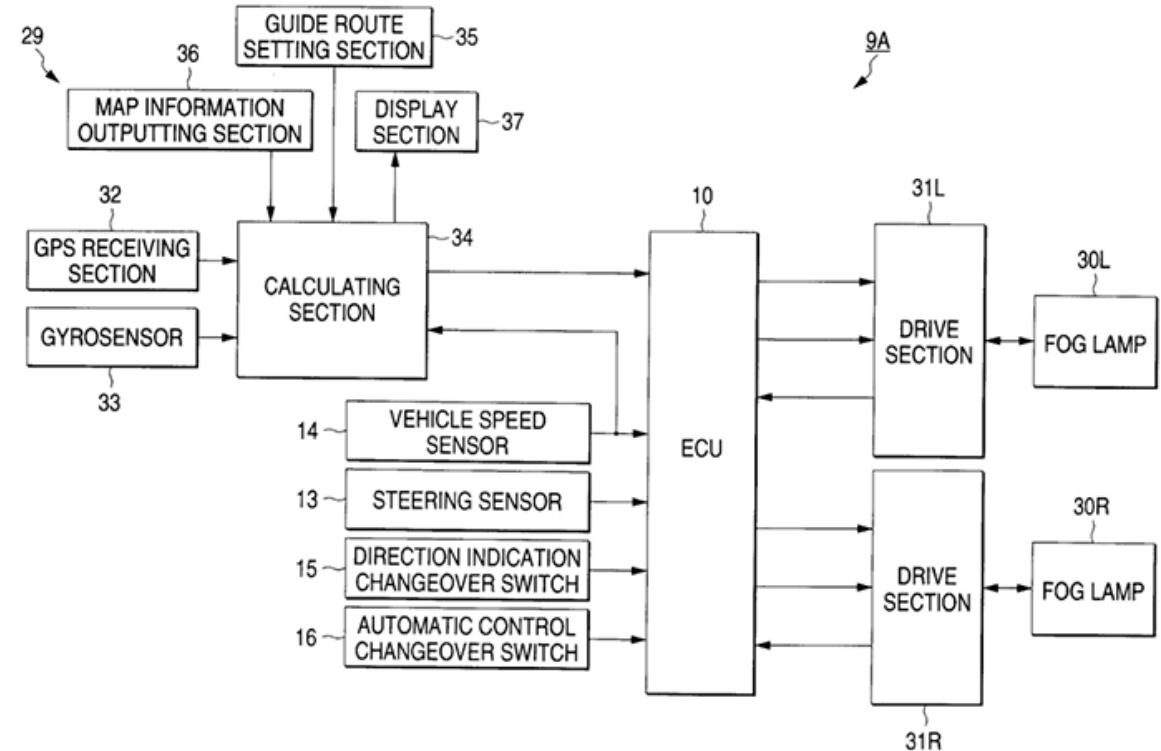


Kobayashi, EX1008, FIG. 1 & 10.

Ground 2: Overview of Kobayashi

FIG. 12 is a block diagram showing an arrangement of the device 9A. ECU 10 is inputted with signals sent from GPS navigation device 29, steering sensor 13, vehicle speed sensor 14, direction indicating switch 15 and automatic control changeover switch 16. Output signals of ECU 10 are sent to the drive sections 31L, 31R of the fog lamps 30L, 30R respectively arranged at the right and left of the front portion of the vehicle.

guidance. Accordingly, when the vehicle advances along a scheduled course, irradiation control of the lamp is conducted in accordance with the course concerned. When it is predicted that the vehicle deviates from the scheduled course, irradiation control is conducted in accordance with the vehicle advancing direction predicted by information such as a direction indicating signal, steering angle detecting signal and vehicle speed detecting signal except for information about the scheduled course.



Kobayashi, EX1008, 17:8-15, 17:59-67.

Kobayashi, EX1008, FIG. 12.

Ground 2: PO is Wrong about Beam's "Maximum Intensity" Statements

139. Additionally, I explained in paragraph 70 of my First Declaration that

Beam's system "us[es] that information to *control the intensity, and/or the angular position*, of one or more" LEDs. See EX1005, Abstract. Beam thus explains that it *controls intensity including angular position* to a maximum desired in a given direction, and does not default to (using a colloquialism) "full blast" everywhere at

all times as Dr. Turk suggests based on his misunderstanding of "intensity."

Further, Beam's control is "*dynamically varying* in position and in size," in

response to the control input. EX1005, 5:46-54, 6:24-27. So, what Beam discloses

-315 EX1052, ¶105; -318 EX1052, ¶124.

Ground 2: PO is Wrong about Beam's “Maximum Intensity” Statements

This invention relates to the production of a beam of light comprised of many microbeams, controlled by incoming radiation, employing a sensor to determine the location of light sources forward of the apparatus and using that information to control the intensity, and/or the angular position, of one or more narrow-angle microbeams, which are part of a large number of beams comprising the overall output beam.

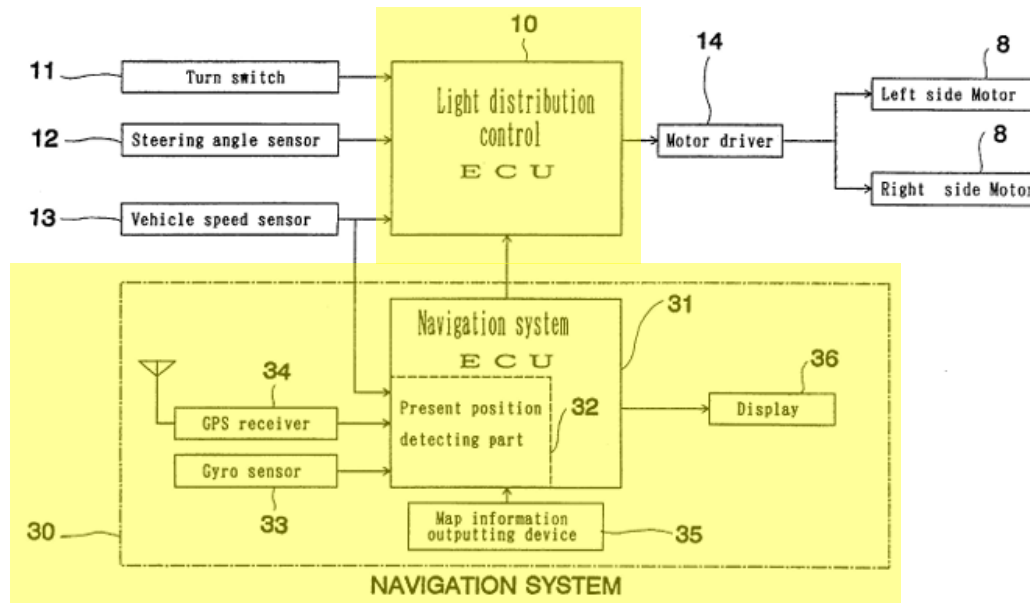
Beam, EX1005, Abstract.

Ground 4: Overview of Gotou

A head lamp device for a vehicle in which a lighting region in front of the vehicle in a traveling direction can be adjusted in rightward and leftward directions comprises: a direction

Gotou, EX1012, Abstract.

FIG. 3



Gotou, EX1012, FIG. 3.

FIG. 8

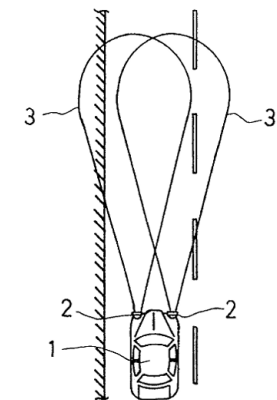
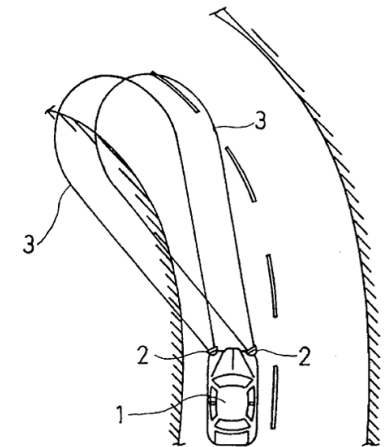


FIG. 9



Gotou, EX1012, FIGS. 8 & 9.

Ground 4: Karlsson's Adaptive LED Array Does Not Default to "all LEDs on"

159. In paragraph 82 of the Second Turk Declaration (EX2024), Dr. Turk states that "Karlsson, like Beam, forms emitted beam 7 (Fig. 1) by using the entire beam array at full intensity, except when avoiding glare, at which point, window 50, of reduced illumination (Fig. 14) is created to address glare situations." This is a gross misstatement of what Karlsson discloses to a POSA. Karlsson does not disclose full or maximum intensity at all times except to reduce glare.

161. Simply put, in direct contradiction to Dr. Turk's mischaracterization above and his misstatement at paragraph 210 of the Second Turk Declaration that "[t]here is nothing in Karlsson to suggest that window 50 is the actual beam that would be used for driving," Karlsson expressly states that "[t]he *emitted light beam 50 is represented as a window which can shift in the plane of the drawings from the left to the right and from the top to the bottom, if desired, and vice versa, and which may vary as regards its shape and dimension in dependence on the desired pattern and direction of the beam.*" EX1010, 19:29-33; EX1003, ¶91. A POSA would not find anything unclear about this statement in Karlsson. Below, I illustrate several beam patterns that Karlsson would create via its emitted light

-315 EX1052, ¶¶171, 173;
-318 EX1052, ¶¶159, 161.

Ground 4: Karlsson (like Gotou) Considers Road Curves

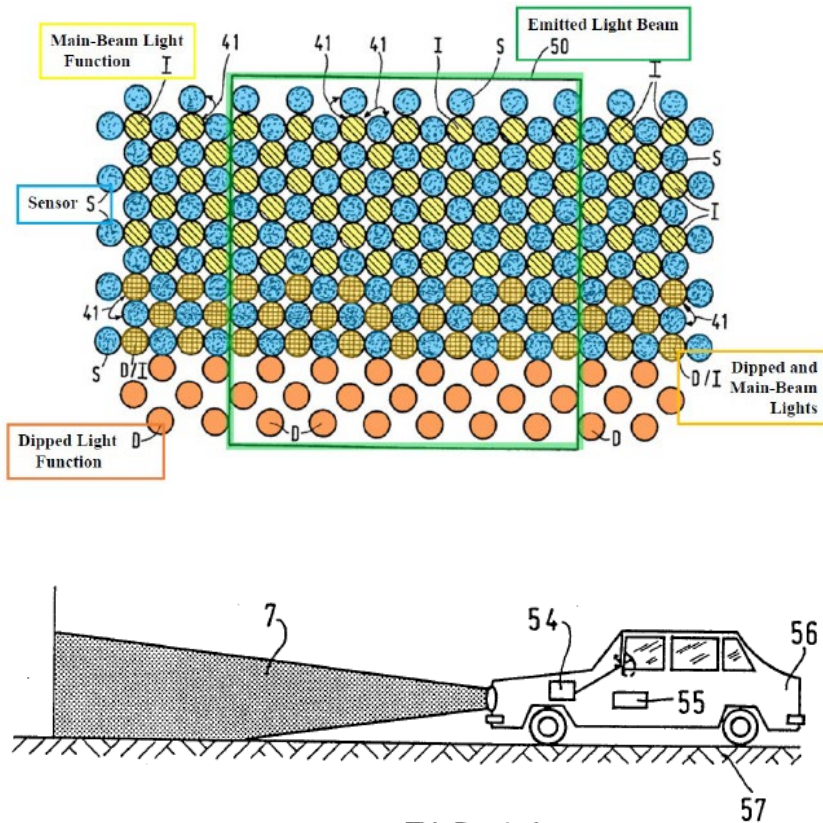


FIG.16

The car 56 shown in Figure 16 is furthermore provided with an inclination sensor 55 and with a direction sensor 54, which is for example connected to the steering wheel. The inclination sensor 55 delivers a signal with regard to the angle of inclination of the car with respect to the road surface 57, in such a manner that the light beam 7 to be emitted is adapted to the respective regulations at all times, also if the car 56 accelerates or decelerates with great force, or when said car is for example overloaded. The direction sensor 54 is in particular intended for determining when the car 56 is taking a bend, so that the light beam 7 can be adapted to prevent the traffic on the other side of the road from being blinded as much as possible.

Karlsson, EX1010, 20:22-32.

Karlsson, EX1010, FIG. 14 (annotated), FIG. 16.

'551 Patent – Independent Claim 32

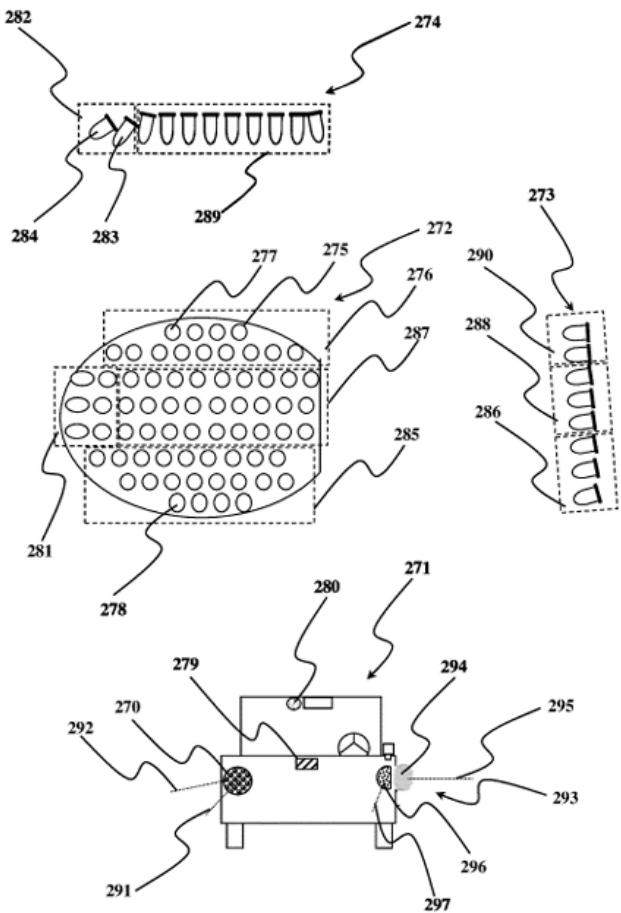


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 32	U.S. Pat. No. 9,955,551
[32.p]	An illuminating device having automatic control of light provided to an illuminated area comprising:
[32.1]	a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;
[32.2]	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;
[32.3]	electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;
[32.4]	one or more processors;

'551 Patent – Independent Claim 32

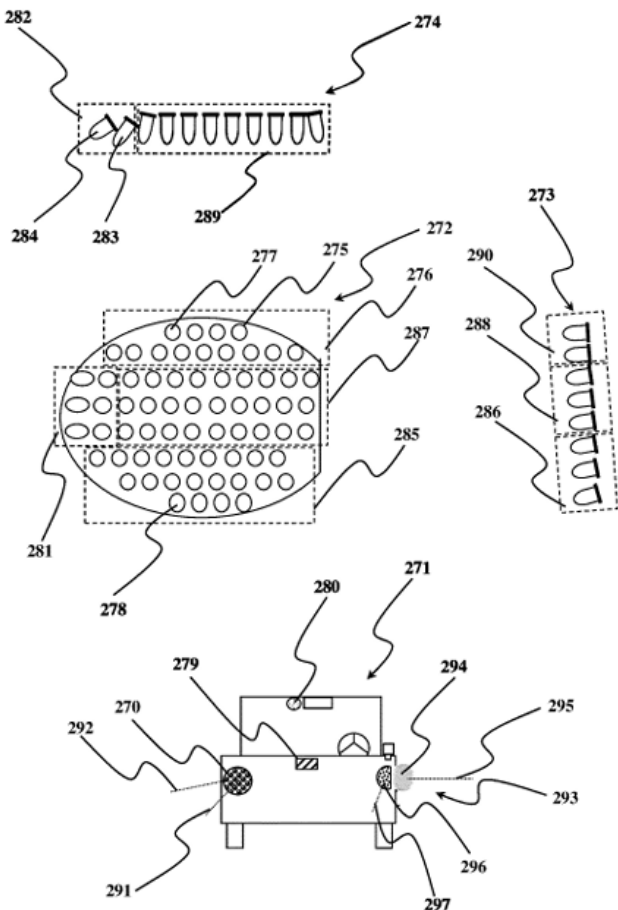


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 32	U.S. Pat. No. 9,955,551
[32.5]	one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area and positioned to capture an image of at least one target, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors
[32.6]	a controller, including at least one of the one or more processors, integrated with the structure via mounting, in communication with the controlling power electronic circuitry apparatus, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and
[32.7]	memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:
[32.8a]	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, 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,

'551 Patent – Independent Claim 32

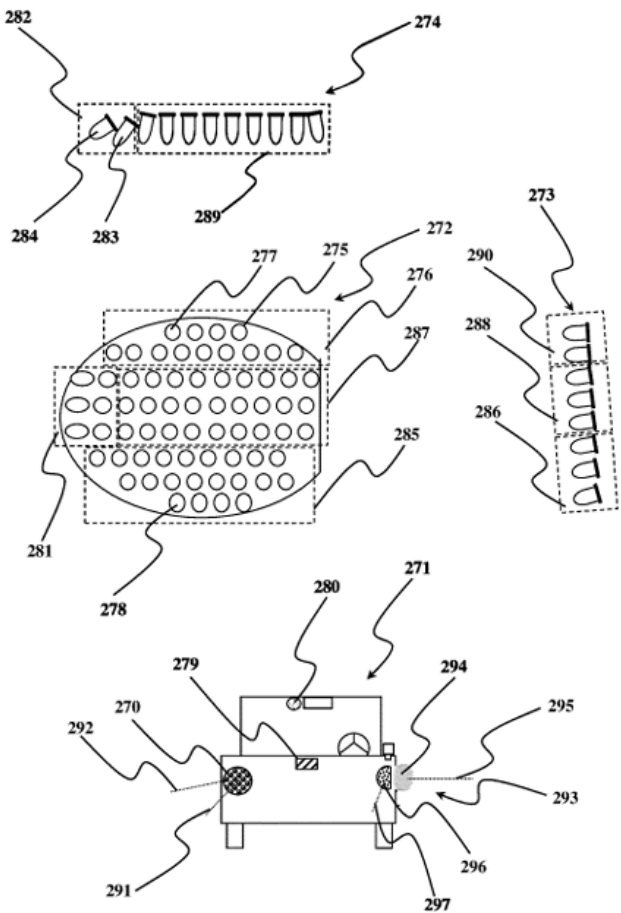


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 32	U.S. Pat. No. 9,955,551
[32.8b]	the beam diminished in intensity relative to the broader field of illumination illuminating at least above and on both sides of the beam; and
[32.9]	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.

'551 Patent – Independent Claim 40

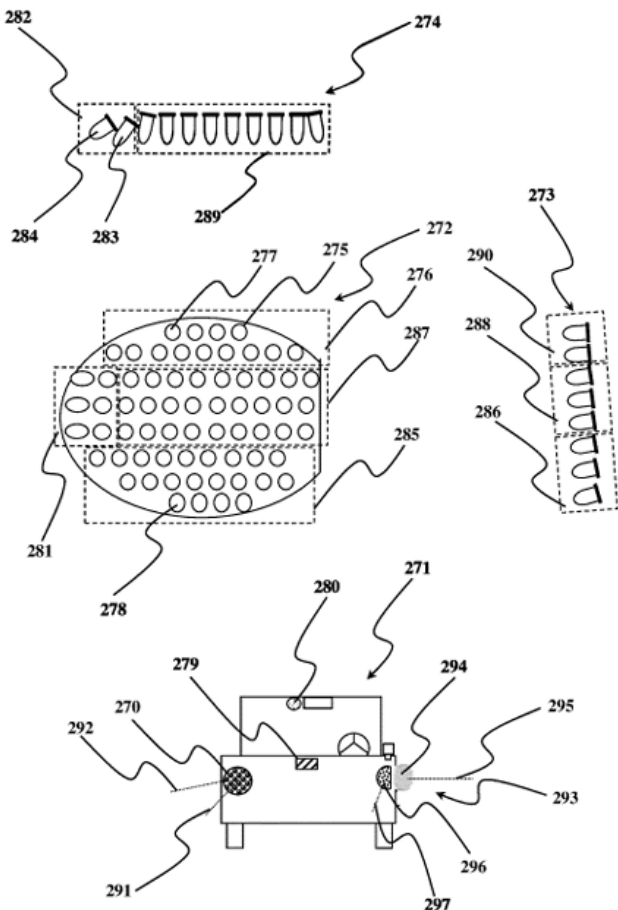


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 40	U.S. Pat. No. 9,955,551
[40.p]	An illuminating device having automatic control of light provided to an illuminated area comprising:
[40.1]	a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;
[40.2]	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;
[40.3]	electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;
[40.4]	one or more processors;
[40.5]	one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area and positioned to capture an image of at least two other vehicles, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

'551 Patent – Independent Claim 40

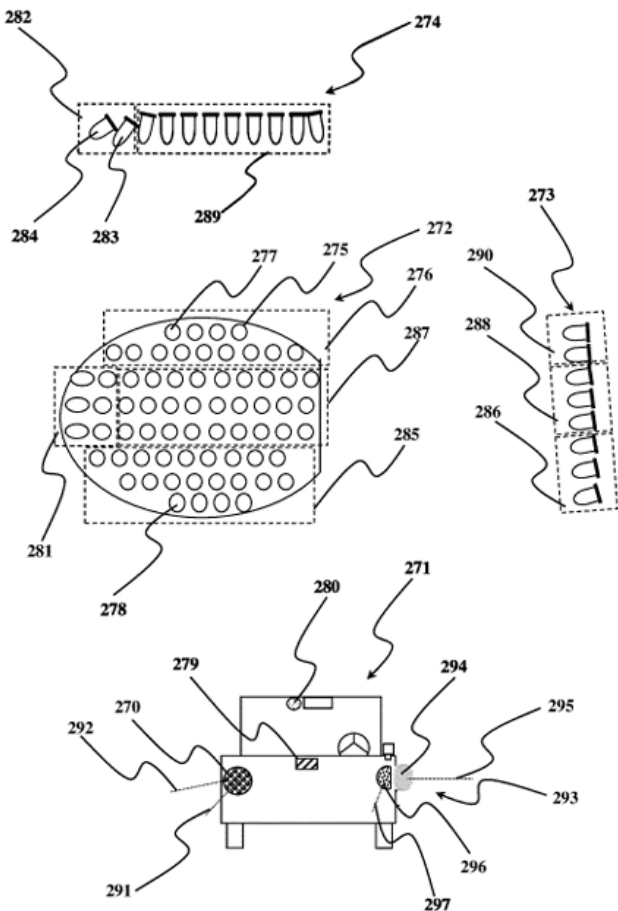


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 40	U.S. Pat. No. 9,955,551
[40.6]	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, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and
[40.7]	memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:
[40.8a]	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;
[40.8b]	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;
[40.8c]	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 the data indicating a second position associated with the second other vehicle;

'551 Patent – Independent Claim 40

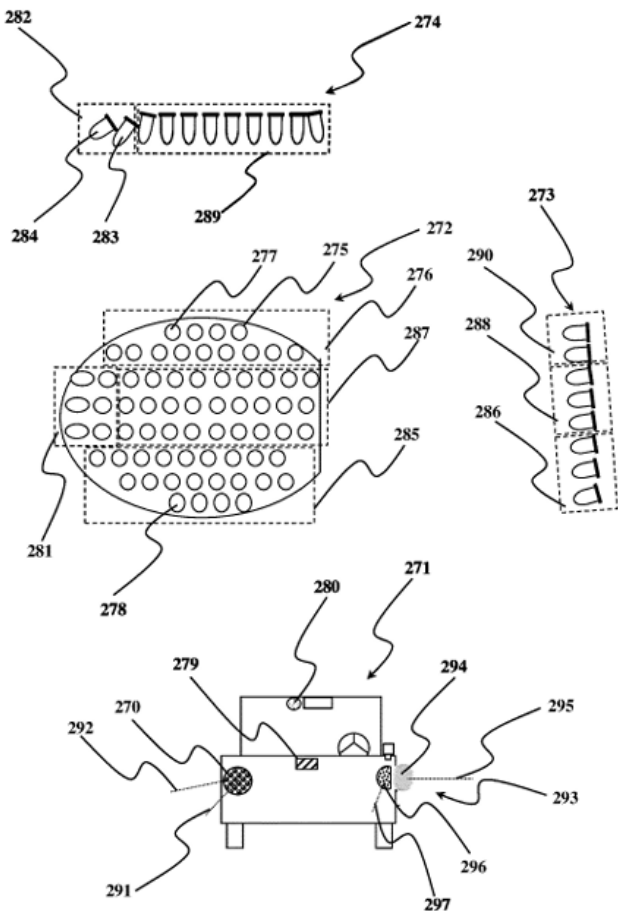


FIG. 15

Issued Claim 40	U.S. Pat. No. 9,955,551
[40.8d]	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;
[40.8e]	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.

'551 Patent, EX1001, FIG. 15.

'551 Patent – Independent Claim 48

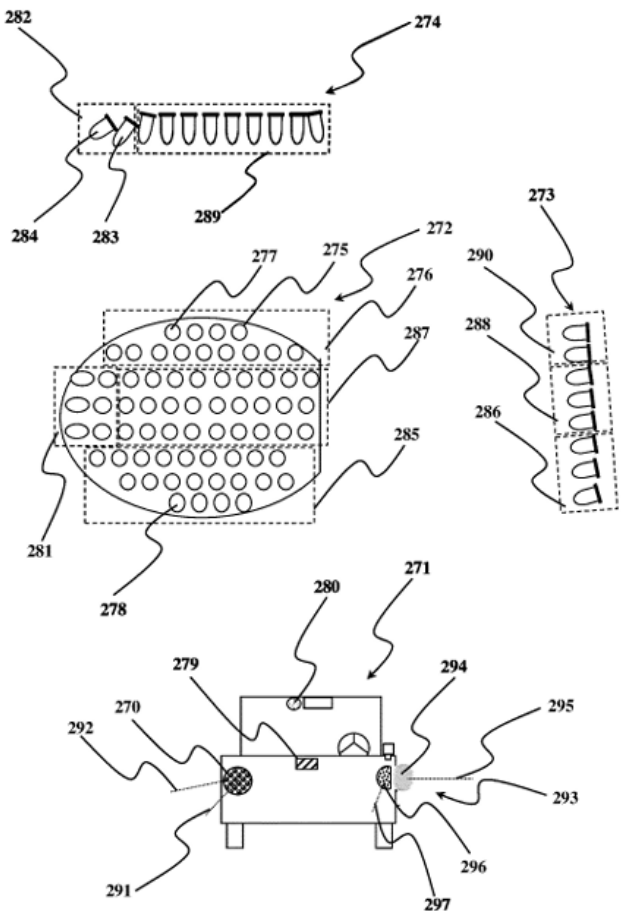


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 48	U.S. Pat. No. 9,955,551
[48.p]	An illuminating device having automatic control of light provided to an illuminated area comprising:
[48.1]	a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;
[48.2]	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;
[48.3]	electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;
[48.4]	one or more processors;
[48.5]	one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

'551 Patent – Independent Claim 48

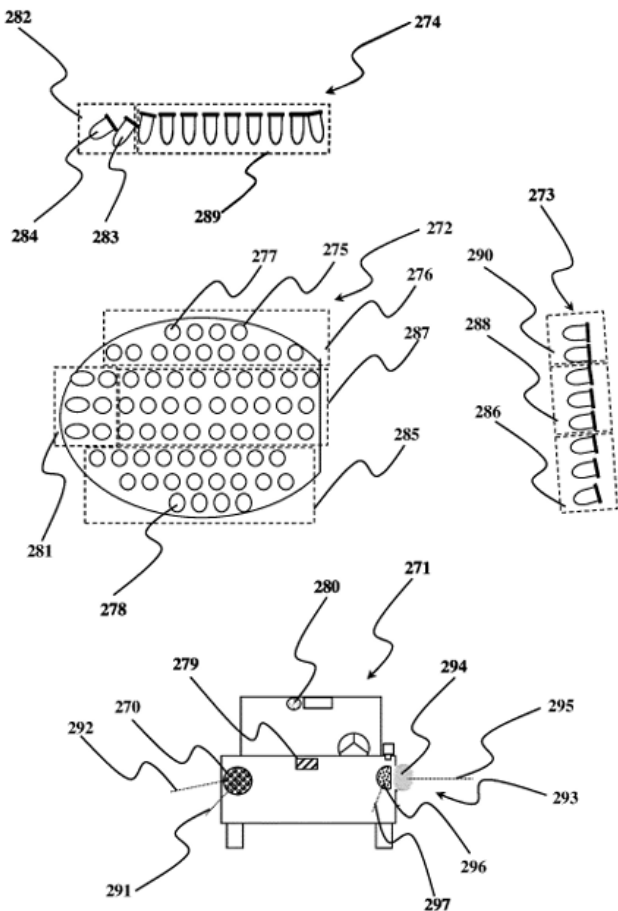


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 48	U.S. Pat. No. 9,955,551
[48.6]	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, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and
[48.7]	memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:
[48.8a]	illuminate a portion of at least one object, indicated by data from at least one of the one or more sensors, 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, the first area determined based at least in part on the data, 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 the first light determined based at least in part on classifying the object based at least in part on the data; and
[48.8b]	control light emitted from the first cluster directed towards the first area to be different in at least one emission characteristic, based on the first light determination, from second light emitted from a second, different cluster of the LEDs, directed towards one or more illuminated second areas at a common elevation with the first area and laterally adjacent to the area.

'551 Patent – Independent Claim 56

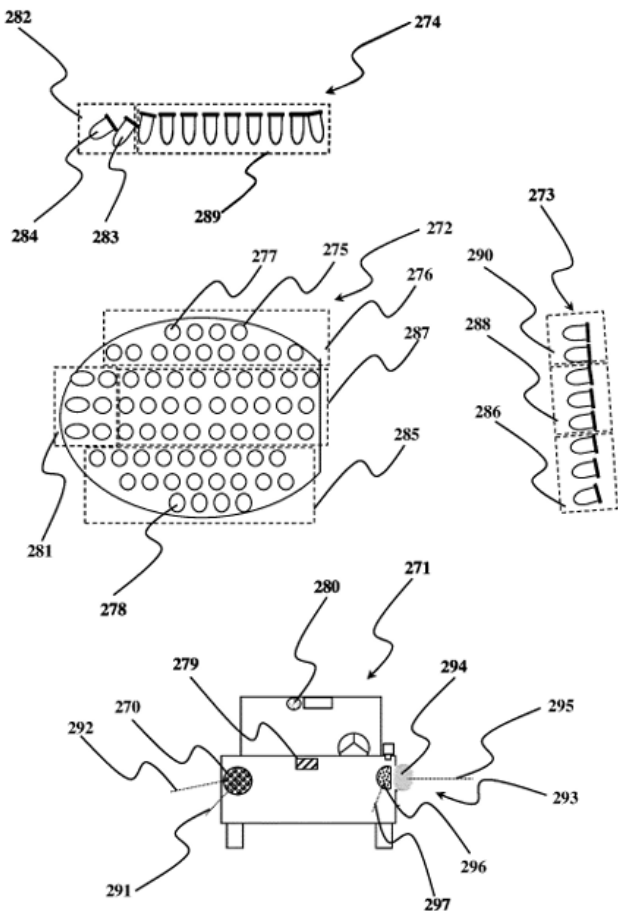


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 56	U.S. Pat. No. 9,955,551
[56.p]	An illuminating device having automatic control of light provided to an illuminated area comprising:
[56.1]	a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;
[56.2]	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;
[56.3]	electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;
[56.4]	one or more processors;
[56.5]	one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area and positioned to capture an image of at least one other vehicle ahead of the motor vehicle, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

'551 Patent – Independent Claim 56

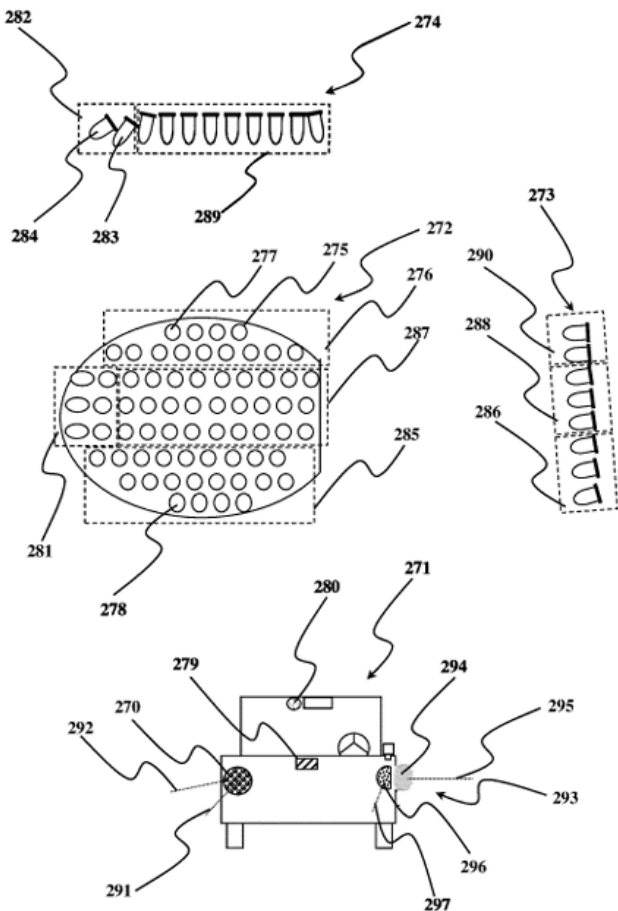


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 56	U.S. Pat. No. 9,955,551
[56.6]	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, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and
[56.7]	memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:
[56.8]	determine, based on data from one or more of the sensors, a vertical and horizontal position associated with the at least one other vehicle;
[56.9]	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
[56.10]	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.

'551 Patent – Independent Claim 64

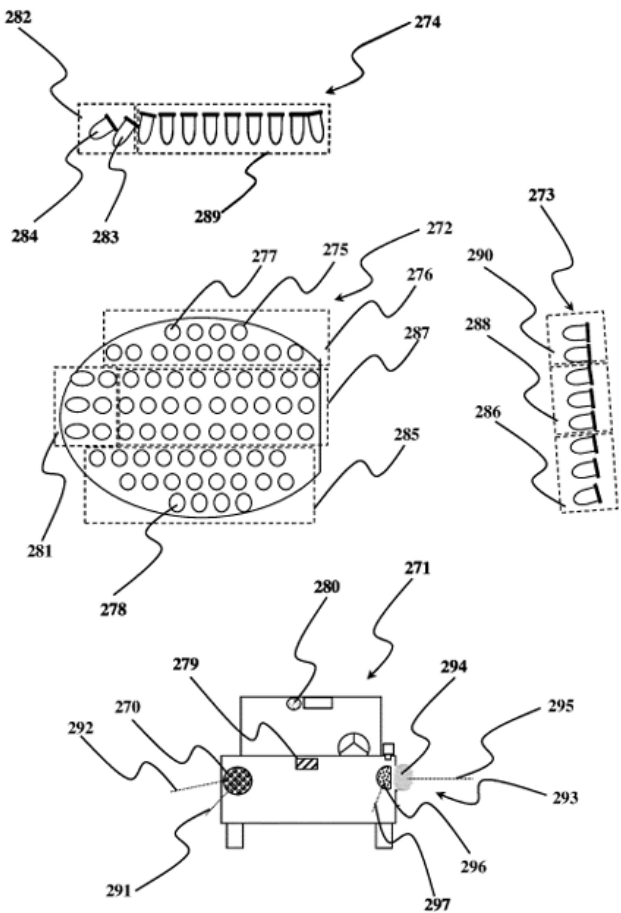


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 64	U.S. Pat. No. 9,955,551
[64.p]	An illuminating device having automatic control of light provided to an illuminated area comprising:
[64.1]	a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;
[64.2]	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 and in communication with a power source;
[64.3]	electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;
[64.4]	one or more processors;
[64.5]	one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area and positioned to capture an image of another vehicle, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

'551 Patent – Independent Claim 64

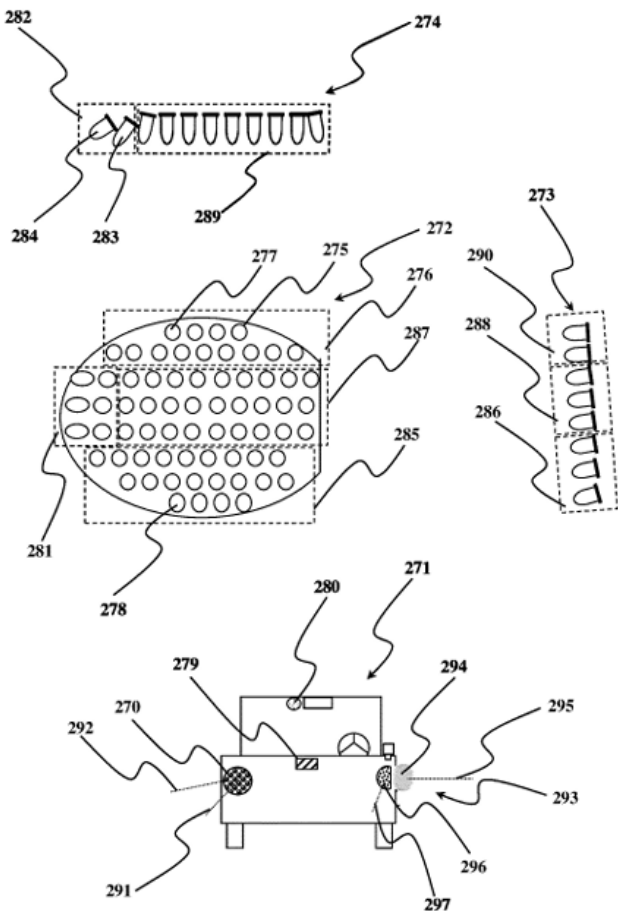


FIG. 15

Issued Claim 64	U.S. Pat. No. 9,955,551
[64.6]	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, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and
[64.7]	memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:
[64.8]	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;
[64.9]	control a first change to one or more characteristics of the light associated with the first cluster of the LEDs that is directed towards the other vehicle, that diminishes glare to a driver of the other vehicle when the other vehicle is at the first position;

'551 Patent, EX1001, FIG. 15.

'551 Patent – Independent Claim 64

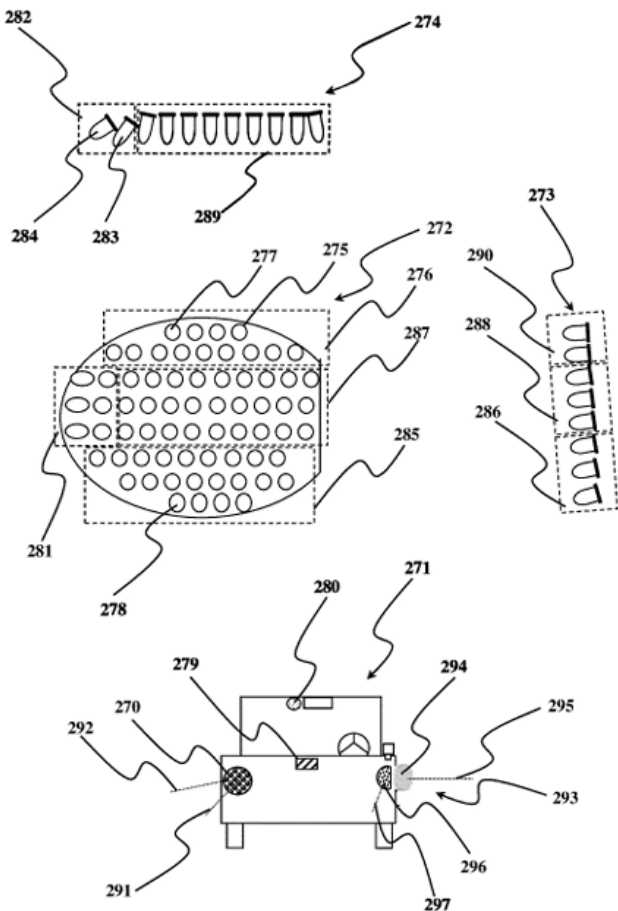


FIG. 15

Issued Claim 64	U.S. Pat. No. 9,955,551
[64.10]	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
[64.11]	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.

'551 Patent, EX1001, FIG. 15.

'551 Patent – Independent Claim 72

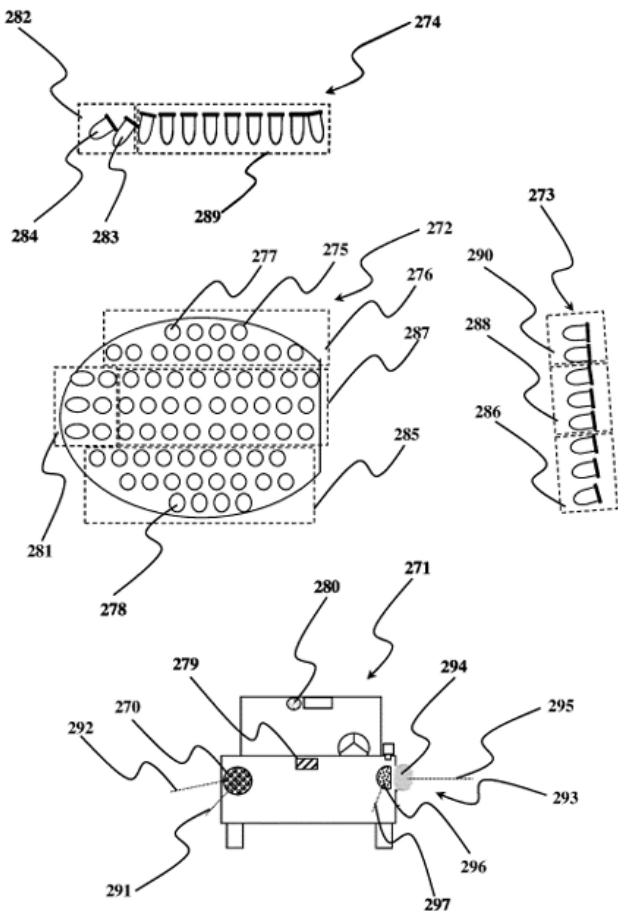


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 72	U.S. Pat. No. 9,955,551
[72.p]	An illuminating device having automatic control of the light provided to an illuminated area comprising:
[72.1]	a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;
[72.2]	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;
[72.3]	electronic circuitry apparatus for the controlled powering of the LEDs and other elements of the illuminating device elements;
[72.4]	one or more processors;
[72.5]	one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

'551 Patent – Independent Claim 72

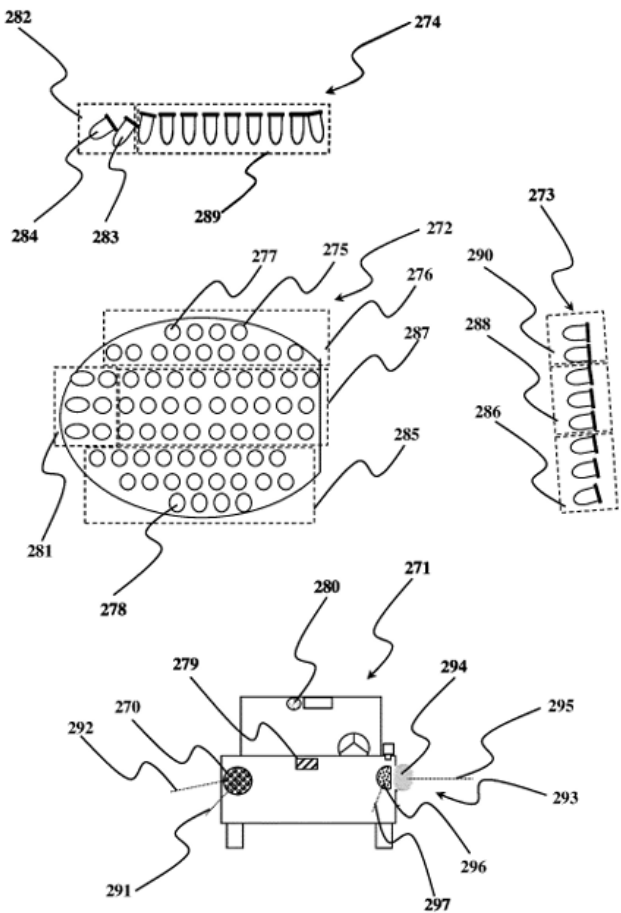


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 72	U.S. Pat. No. 9,955,551
[72.6]	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, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and
[72.7]	memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:
[72.8]	determine a target based on first data from one or more of the sensors;
[72.9]	determine a first target location based on the first data;
[72.10]	select a cluster of the LEDs having light associated therewith that is directed at the target, determined based on the first target location;

'551 Patent – Independent Claim 72

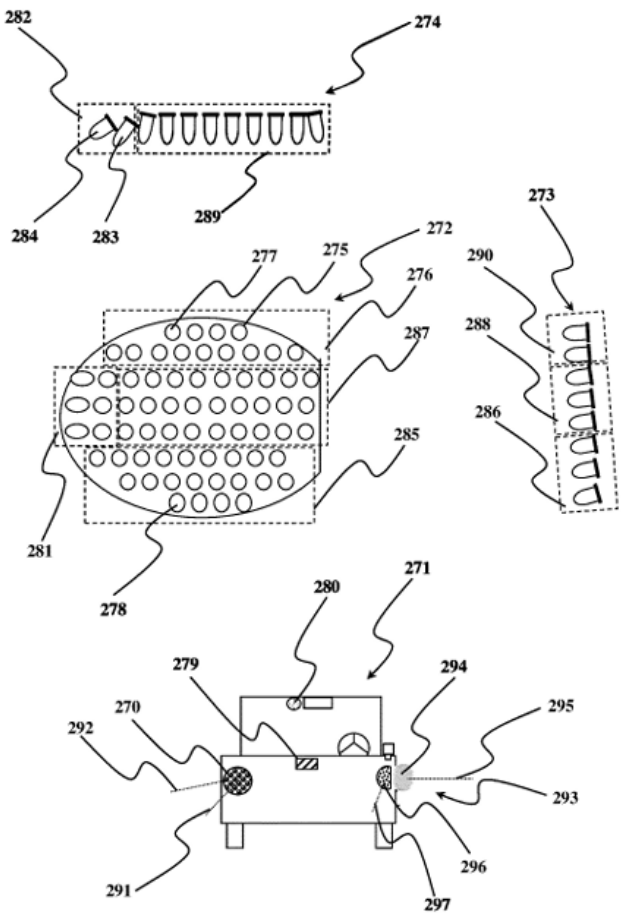


FIG. 15

Issued Claim 72	U.S. Pat. No. 9,955,551
[72.11]	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
[72.12]	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.

'551 Patent, EX1001, FIG. 15.

'551 Patent – Independent Claim 80

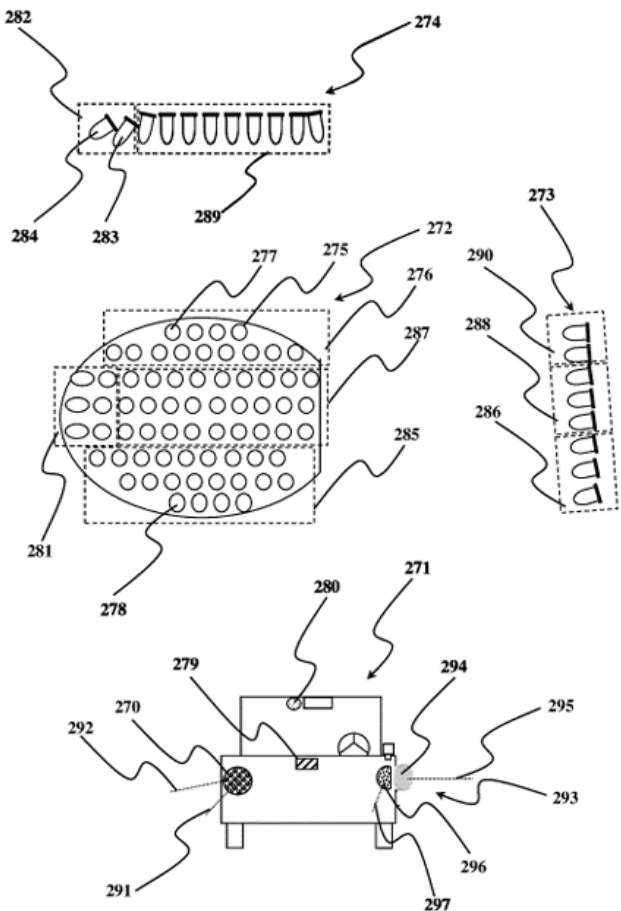


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 80	U.S. Pat. No. 9,955,551
[80.p]	An illuminating device having automatic control of light provided to an illuminated area comprising:
[80.1]	a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;
[80.2]	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;
[80.3]	electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;
[80.4]	one or more processors;
[80.5]	one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the illuminated area and positioned to capture camera data indicating a target ahead of the motor vehicle, at least one of said cameras in communication with power, and in communication with at least one of the one or more processors;

'551 Patent – Independent Claim 80

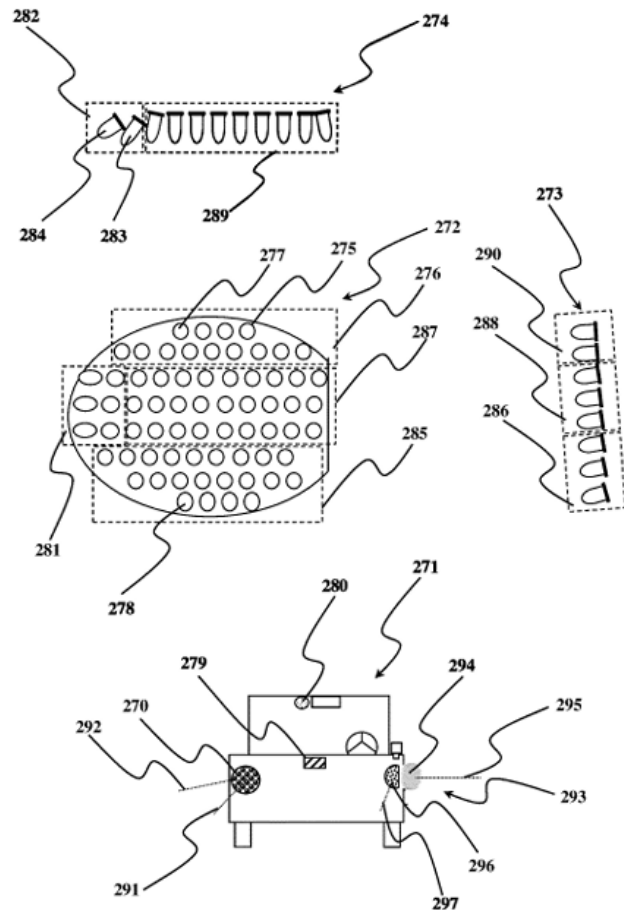


FIG. 15

'551 Patent, EX1001, FIG. 15.

Issued Claim 80	U.S. Pat. No. 9,955,551
[80.6]	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, said controller arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and
[80.7]	memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:
[80.8]	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
[80.9]	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.

The Federal Circuit's *Kyocera* Precedent Is Directly on Point Here

Dr. Turk's "expert testimony on issues from the vantage point of an ordinarily skilled artisan" must be excluded because Dr. Turk does not "possess ordinary skill in the art." *Kyocera*, 22 F.4th at 1377. The Federal Circuit's decision in *Kyocera* illustrates this principle and governs the outcome here.

-315 Pet. Motion to Exclude, p. 11-12;
-318 Pet. Motion to Exclude, p. 11-12.

The Parties Agreed on the POSA Definition

Everyone agreed that the POSA definition in this case requires
“at least 2 years of industry experience **in the area of automotive lighting and lighting-control systems.**”

-315 Petition, p. 7;
-318 Petition, p. 7.

-315 POR, p. 9;
-318 POR, p. 9

C. Level of Ordinary Skill in the Art

A POSA at the time of the alleged invention would have had a bachelor’s degree (B.S.) in mechanical engineering, electrical engineering, optical engineering, applied physics, or an equivalent field, as well as at least 2 years of industry experience in the area of automotive lighting and lighting-control systems. EX1003, ¶¶44-46, 67. The POSA may work as part of a team, for example, with computer engineers to integrate/program controllers and various control inputs to affect control of a given light source. *Id.*

III. Level of Ordinary Skill

Patent Owner does not dispute Petitioner’s proposed level of ordinary skill.

(*See* Pet. at 7.)

Dr. Jiao and Dr. Turk Agreed on the POSA Definition

Everyone agrees that the POSA definition in this case requires
“at least 2 years of industry experience **in the area of automotive lighting and lighting-control systems.**”

Jiao First Dec., -315 EX1003, ¶44;
-318 EX1003, ¶44.

Turk Dep., EX1053, 23:7-13

44. In my opinion, a POSA in the context of the '551 patent as of July 12, 2002 (the earliest possible priority date of the '551 patent)¹ would have had a bachelor of science (B.S.) degree in mechanical engineering, electrical engineering, optical engineering, applied physics, or an equivalent field, as well as at least 2 years of industry experience in the area of automotive lighting and lighting-control systems. The POSA may work as part of a team, for example, with computer

Q. And so you say that the "Patent Owner accepts" this -- "Petitioner's proposed level of ordinary skill in the art."

Do you also accept Petitioner's level of ordinary skill in the art listed there in paragraph 47?

A. Yes, I do.