70. (New) The illuminating device of claim 64, further including one or more optical control elements to control light emitted from one or more of the LEDs.

71. (New) The illuminating device of claim 70, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses.

72. (New) An illuminating device having automatic control of the light provided to an illuminated area comprising:

a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;

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;

electronic circuitry apparatus for the controlled powering of the LEDs and other elements of the illuminating device elements;

one or more processors;

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;

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

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

determine a target based on first data from one or more of the sensors;

determine a first target location based on the first data;

select a cluster of the LEDs having light associated therewith that is directed at the target, determined based on the first target location;

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

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.

73. (New) The illuminating device of claim 72, wherein:

the variation of illumination provided to the target includes variation in at least one of color or intensity or at least a change of at least one LED of the selected cluster to a non-emitting state;

the cluster includes a plurality of the LEDs and the cluster includes non-contiguous LEDs;

the light directed at the target is determined based at least in part on known directionality of light emitted by the first cluster exiting from the at least one headlamp; and

at least one of the first data or the subsequent data includes image data.

74. (New) The illuminating device of claim 72, 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 headlamps.

75. (New) The illuminating device of claim 74, wherein:

the variation of illumination provided to the target includes variation in at least one of color or intensity or at least a change of at least one LED of the selected cluster to a non-emitting state;

the selected cluster includes a plurality of the LEDs and the selected cluster includes non-contiguous LEDs;

the light directed at the target is determined based at least in part on known directionality of light emitted by 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.

76. (New) The illuminating device of claim 74, wherein the identification of the upcoming road curvature is based at least in part on map data and wherein the adaptation of the light pattern is based at least in part on the map data.

77. (New) The illuminating device of claim 74, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data.

78. (New) The illuminating device of claim 72, further including one or more optical control elements to control light emitted from one or more of the LEDs.

79. (New) The illuminating device of claim 78 wherein the optical control elements include at least one of one or more reflectors, refractors or lenses.

80. (New) An illuminating device having automatic control of light provided to an illuminated area comprising:

a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;

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;

electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;

one or more processors;

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;

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

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

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

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.

81. (New) The illuminating device of claim 80, wherein:

the data includes image data;

the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to select a first cluster of LEDs, associated with the first light, for the change, based at least in part on known aimings of the first light associated with the first cluster having a correlation to the at least the portion, the known aimings based at least in part on at least one of known directionality of light emitted by the first cluster or known directionality of light emitted by the first cluster exiting the headlamp; and

the change to emission of the one or more LEDs aimed towards the at least the portion includes a change to intensity or color or a change of at least one of the LEDs to a non-emitting state.

82. (New) The illuminating device of claim 80, 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.

83. (New) The illuminating device of claim 82, wherein:

the change to emission of the one or more LEDs aimed towards the at least the portion includes a change to intensity or color or a change of at least one of the LEDs to a non-emitting state;

the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to select a first cluster of LEDs, associated with the first light, for the change, based at least in part on known aimings of the first light associated with the first cluster having a correlation to the at least the portion, the known aimings based at least in part on at least one of known directionality of light emitted by the first cluster or known directionality of light emitted by the first cluster exiting the 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.

84. (New) The illuminating device of claim 82, wherein the identification of the upcoming road curvature is based at least in part on map data and wherein the adaptation of the light pattern is based at least in part on the map data.

85. (New) The illuminating device of claim 82, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data.

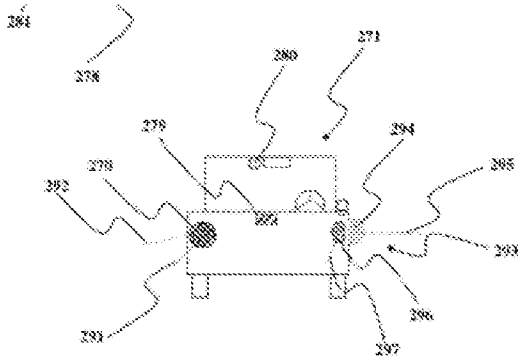
86. (New) The illuminating device of claim 80, further including one or more optical control elements to control light emitted from one or more of the LEDs.

87. (New) The illuminating device of claim 86, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses.

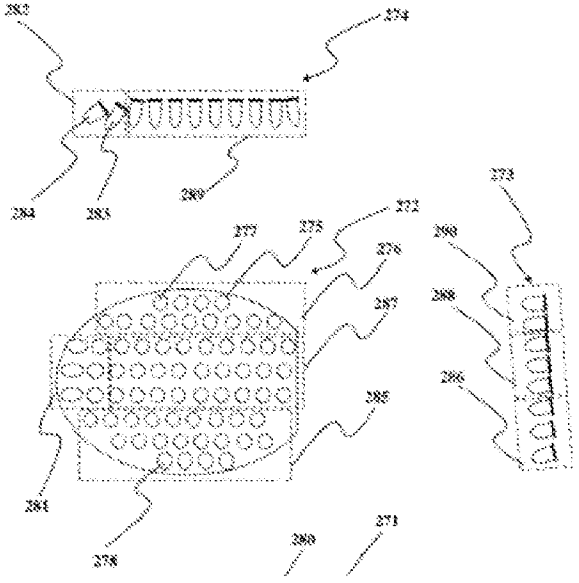
# Exhibit OTH-D
## Support for New Claims

**Support for New Claims for '551 Patent**

Representative support for the new claims may be found at least in the following sections and Figures of the '551 Patent:

| *Proposed Claim* | Support from '551 Patent |
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| 24. (New) An illuminating device having automatic control of light provided to an illuminated area comprising: | **Claim 6 of the '551 Patent** |
| a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle; | **Claim 6 of the '551 Patent**<br><br>**Fig. 15 (bottom):**<br><br>  <br><br>**53:45-54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a |

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| | cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. |

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| | The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| 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; | **Claim 6 of the '551 patent**<br><br>**Fig. 15 (top):**<br>  <br><br>**53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light |

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| | distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**17:3-16**<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital |

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| | luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. |
| electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements; | **Claim 6 of the '551 patent** |
| one or more processors; | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. |

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| least one of the one or more processors; | **25:53-67**<br>Sensors **8** include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer |

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| | algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … |
| memory storing instructions that, when executed by one or more processors of the controller, enable the controller to: | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| determine first coordinates corresponding to an other vehicle, based on the coordinate-specific information; | **45:53-55**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which |

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| | will project light at the speaker as the speaker move about the room.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**52:54-65**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout. |

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| | **95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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 | **45:53-55**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**52:54-65**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to |

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| | determine which exact aiming is the maximum allowable for any given traffic situation and road layout. |
| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications. |
| | **95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |

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| 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. | **45:53-55**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**52:54-65**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating |

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| | devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 25. (New) The illuminating device of claim 24, wherein:<br>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; and<br>the cluster includes a plurality of the LEDs and | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand.<br><br>**53:27-37**<br>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 |

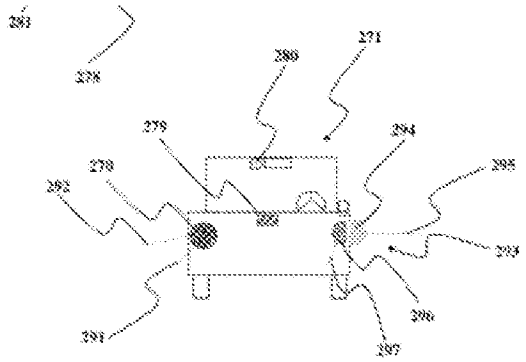
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| the cluster includes non-contiguous LEDs. | with other clusters or sub-clusters, such as high beam function versus a second cluster **278** which may provide a parking light function. The same SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
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| 26. (New) 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:<br>identify an upcoming road curvature along a road on which the motor vehicle is traveling; and<br>accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the at least one headlamps. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of town. At any instant in time the intensity, spectrum and beam patter of the head-lamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and other factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime.<br><br>**51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern |

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| | and color spectrum will be changed according to the instantaneous road conditions at hand.<br><br>**51:43-56**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
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| 27. (New) The illuminating device of claim 26, 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 | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |

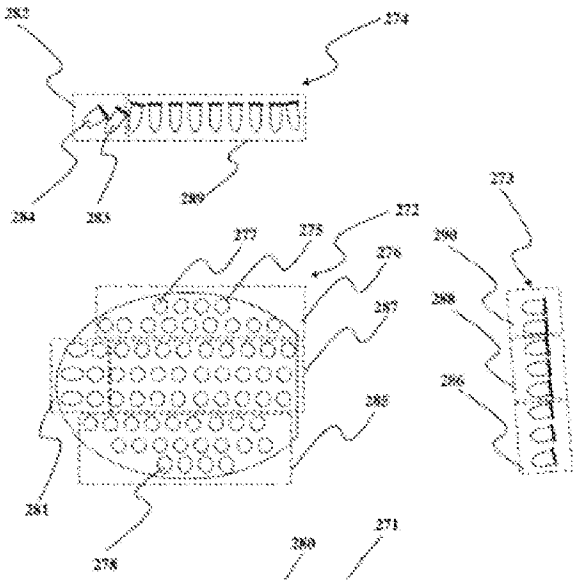
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| cluster to a non-emitting state;<br>the cluster includes a plurality of the LEDs and the cluster includes non-contiguous LEDs; and | **53:27-37**<br>The concept cluster shown by the dashed lines, is used to describe a control function and is not 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**51:51-56**<br>At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
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| 28. (New) The illuminating device of claim 26, wherein the identification of the upcoming road curvature is based at least in part on map data and wherein the | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any |

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| adaptation of the light pattern is based at least in part on the map data. | instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 29. (New) The illuminating device of claim 26, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 30. (New) The illuminating device of claim 24, further including one or more optical control elements to control light emitted from one or more of the LEDs. | **25:5-9**<br>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. |
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| 31. (New) The illuminating device of claim 30, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses. | **25:5-9**<br>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. |
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| 32. (New) An illuminating device having automatic control of light provided to an illuminated area comprising: | **Claim 6 of the '551 Patent** |
| a structure for incorporating illuminating device elements, wherein | **Claim 6 of the '551 Patent** |

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| the structure comprises a motor vehicle; | **Fig. 15 (bottom):**<br>  <br>**53:45 – 54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with |

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| | SLSs of front view **272** cluster **285** corresponding to cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| a plurality of individually controllable LEDs incorporated in the structure via at least one | **Claim 6 of the '551 patent** |

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| headlamp mounted to the structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source; | **FIG. 15 (top):**<br>  <br>**53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. The concept cluster shown by the dashed lines, is used to describe a control function and is not |

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| | 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**17:3-16**<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. |
| electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements; | **Claim 6 of the '551 patent** |

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| one or more processors; | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. |
| 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; | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>25:53-67<br>Sensors 8 include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may |

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| | be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … |

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| memory storing instructions that, when executed by one or more processors of the controller, enable the controller to: | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>54:45-47<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| create a beam of diminished illumination illuminating at least a portion of the at least one target with non-glaring illumination, created within 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 | **52:54 - 53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent |

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| the beam, the beam diminished in intensity relative to the broader field of illumination illuminating at least above and on both sides of the beam; and | of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14-22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>**22:26-48**<br>In another example of prior art practice a table lamp for reading is provided with a shade. The shade is there to partially redirect the light onto the book and also prevent direct, glaring, rays from the lamp used for general lighting from reaching the reader's eyes. According to the present invention, instead of having a glaring lamp producing light which is then made non-glaring by a shade at a loss in excess of 50% the LF is built such the amounts of light directed downward at useful angles and the amount of light directed upward are in the correct ratio. The surface area, from which discomfort-glare causing rays exit, is designed such that the luminous exitance is within recommended UGR levels for home use. The fixture has no need for a shade to protect from glare; the glare was never produced at those angles to begin with due to proper geometric design. To get the desired luminous exitance expressed in terms of |

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| | lumen per sq. meter or luminance in terms of candela per sq. meter, the light exiting the source of specific intensity at angles which normally reach the room occupant's eyes, is spread over an area such that the exiting light is non-glaring. These lighting design parameters serve as the product specification and are incorporated into the initial design. There is no need to add on components to achieve correct lighting.<br><br>45:27-44<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| follow, based at least in part on data from one or more of the cameras, the at least one target with the | **45:45-67**<br>In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the |

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| diminished illumination as the at least one target changes location relative to the motor vehicle. | pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. It is to be understood that in a theater lighting application there is no need for a preprogrammed moving light using motors to change position. Instead a fixed DLF or ADLF with multiple light sources powers the necessary light sources to illuminate the performer as he or she moves about the stage. This actually is similar to the banks of shuttered lights used in present day stage lighting. Only now the digital aspect of discrete multiple light sources allowing for a smooth transition of aimings with instantaneous control of almost infinite variation of spectrum and intensity is accomplished.<br><br>**51:59-65**<br>Additional features include an optional concentrated flashlight type of beam to illuminate distant overhead and roadside signs, which due to the narrow directed beam will not blind oncoming traffic. Image recognition via a camera will allow the beam to follow the retroreflective sign as the vehicle moves or the signs will be provided with a special marker for this purpose. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 33. (New) The illuminating device of claim 32 wherein: | |
| the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to select the cluster of LEDs based at least in part on known aimings of the first light associated with the first cluster having a correlation to the at least the portion, the known aimings based at least in part on at least one of known directionality of light emitted by the first cluster or known directionality of light emitted by the first cluster exiting the headlamp; | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications. |

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| | 95:3-14<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| the data includes image data; | 52:27-42<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| the one or more changes to characteristics of the first light include a change to at least one of intensity or | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and |

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| color or a change of at least one LED of the cluster to a non-emitting state; and | spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| the cluster includes a plurality of the LEDs and the cluster includes non-contiguous LEDs. | 53:27-37<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
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| 34. (New) The illuminating device of claim 32, wherein the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to: | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the |

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| | optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
| identify an upcoming road curvature along a road on which the motor vehicle is traveling; and | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the at least one headlamps. | **51:43-56**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
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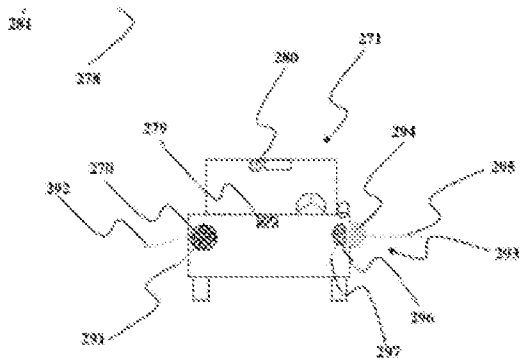
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| 35. (New) The illuminating device of claim 34, wherein: | |
| the one or more changes to characteristics of the first light include a change to at least one of intensity or color or a change of at least one LED of the cluster to a non-emitting state; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| the cluster includes a plurality of the LEDs and the cluster includes non-contiguous LEDs; | **53:27-37**<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| the memory further stores instructions that, when executed by one or more processors of the controller, enable the | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which |

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| controller to select the cluster of LEDs based at least in part on known aimings of the first light associated with the first cluster having a correlation to the at least the portion, the known aimings based at least in part on at least one of known directionality of light emitted by the first cluster or known directionality of light emitted by the first cluster exiting the headlamp; and | will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such |

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| | changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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. | **51:51-56**<br>At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
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| 36. (New) The illuminating device of claim 34, wherein the identification of the upcoming road curvature | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous |

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| is based at least in part on map data and wherein the adaptation of the light pattern is based at least in part on the map data. | road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 37. (New) The illuminating device of claim 34, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |

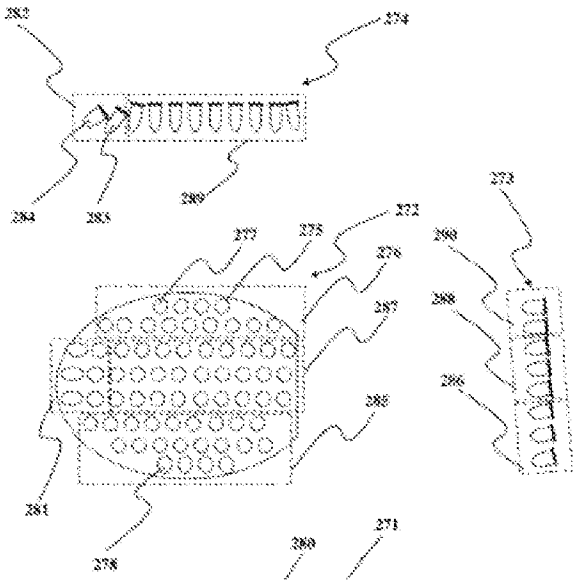
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| 38. (New) The illuminating device of claim 32, further including one or more optical control elements to control light emitted from one or more of the LEDs. | **25:5-9**<br>The direction of light exiting from the DLF as a whole or from each SLS individually is controllable by optical elements **6**, such as reflective surfaces and or refractors, and may be electronically variable optical elements. |
| 39. (New) The illuminating device of claim 38, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses. | **25:5-9**<br>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 |
| 40. (New) An illuminating device having automatic control of light provided to an illuminated area comprising: | **Claim 6 of the '551 patent** |
| a structure for incorporating illuminating device elements, wherein | **Claim 6 of the '551 Patent** |

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| the structure comprises a motor vehicle; | **Fig. 15 (bottom):**<br>  <br>**53:45-54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to |

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| | cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the | **Claim 6 of the '551 patent** |

structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;

**Fig. 15 (top):**



**53:13-37**

In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. The concept cluster shown by the dashed lines, is used to describe a control function and is not

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| | 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**17:3-16**<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. |
| electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements; | **Claim 6 of the '551 patent** |

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| one or more processors; | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. |
| 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; | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53-67**<br>Sensors 8 include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may |

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| | be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller 279 which receives traffic data from sensors 280 … |

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| memory storing instructions that, when executed by one or more processors of the controller, enable the controller to: | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| 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; | **53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.

**52:27-42**

A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles.

**45:45-57**

In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the

pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

**95:3-14**

There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which

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| | disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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; | **52:54-53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14 – 22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a |

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| | workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>**45:27-44**<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other |

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| | radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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; | **53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power |

distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.

**52:27-42**

A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of

headlamps from oncoming vehicles and tail lamps from leading vehicles.

**45:45-57**

In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

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| | **95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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, | **52:54-53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to |

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| | follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14-22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>**45:27-44**<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will |

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| | control the luminance by varying the spatial light intensity distribution over the different surfaces.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |

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| 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. | **22:14-22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>**45:27-44**<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 41. (New) The illuminating device of claim 40, wherein: | |
| the data includes image data: | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |
| at least one of the first or second change to characteristics of light associated with at least one of the first or second cluster of LEDs includes at least one of a change to color, to intensity, or a change of at least one LED | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |

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| of the respective cluster to a non-emitting state; | |
| 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; | **53:27-37**<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| the determination of the first cluster includes selection of the first cluster based at least in part on known aimings of light associated with the first cluster having a correlation to the first position, the known aimings based at least in part on at least one of known directionality of light emitted by the first cluster or known directionality of light | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of |

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| emitted by the first cluster exiting the headlamp; and | lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>95:3-14<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| the determination of the second cluster includes selection of the second cluster based at least in part on known aimings of light associated with the second cluster having a correlation to the second | 45:52-57<br>The controller 195, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. |

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| position, the known aimings based at least in part on at least one of known directionality of light emitted by the second cluster or known directionality of light emitted by the second cluster exiting the headlamp. | **25:5-9**<br>**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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are |

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| | deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 42. (New) The illuminating device of claim 40, wherein the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to: | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| identify an upcoming road curvature along a road on which the motor vehicle is traveling; and | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the at least one headlamps. | **51:43-56**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam |

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| | pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
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| 43. (New) The illuminating device of claim 42, wherein: | |
| at least one of the first or second change to characteristics of light associated with at least one of the first or second cluster of LEDs includes at least one of a change to color, to intensity, or a change of at least one LED of the respective cluster to a non-emitting state; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| 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 | 53:27-37<br>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 |

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| the second cluster includes non-contiguous LEDs; | versus a second cluster **278** which may provide a parking light function. The same SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| the determination of the first cluster includes selection of the first cluster based at least in part on known aimings of light associated with the first cluster having a correlation to the first position, the known aimings based at least in part on at least one of known directionality of light emitted by the first cluster or known directionality of light emitted by the first cluster exiting the headlamp; | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications. |

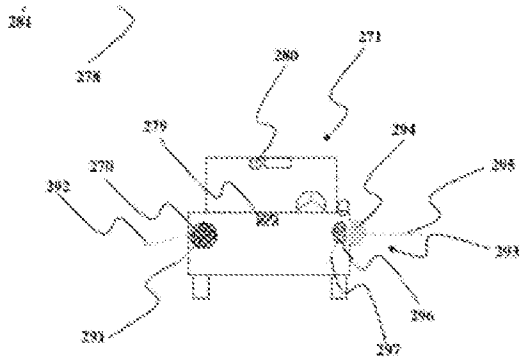
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| | 95:3-14<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| the determination of the second cluster includes selection of the second cluster based at least in part on known aimings of light associated with the second cluster having a correlation to the second position, the known aimings based at least in part on at least one of known directionality of light emitted by the second cluster or known directionality of light emitted by the second | 51:51-56<br>At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |

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| cluster exiting the headlamp; and<br>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. | |
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| 44. (New) The illuminating device of claim 42, wherein the identification of the upcoming road curvature is based at least in part on map data and wherein the | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any |

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| adaptation of the light pattern is based at least in part on the map data. | instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 45. (New) The illuminating device of claim 42, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 46. (New) The illuminating device of claim 40, further including one or more optical control elements to control light emitted from one or more of the LEDs. | **25:5-9**<br>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. |
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| 47. (New) The illuminating device of claim 46, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses. | **25:5-9**<br>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. |
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| 48. (New) An illuminating device having automatic control of light provided to an illuminated area comprising: | **Claim 6 of the '551 patent** |
| a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle; | **Claim 6 of the '551 Patent** |

**Fig. 15 (bottom):**



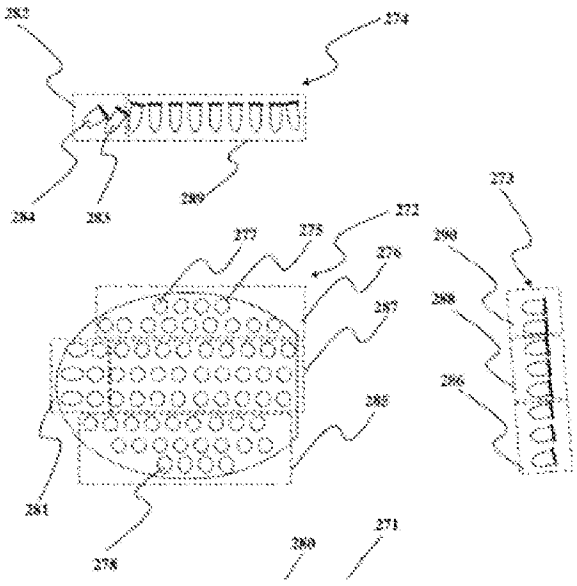

**53:45-54:.47**

Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to

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| | cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the | **Claim 6 of the '551 patent** |

structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;

**Fig. 15 (top):**



**53:13-37**

In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. The concept cluster shown by the dashed lines, is used to describe a control function and is not

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| | 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**17:3-16**<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. |
| electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements; | **Claim 6 of the '551 patent** |

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| one or more processors; | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. |
| 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; | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53-67**<br>Sensors **8** include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may |

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| | be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … |

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| memory storing instructions that, when executed by one or more processors of the controller, enable the controller to: | **25:42 – 50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| 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 | **50:37-56**<br>The digital lighting concept is extended to transportation vehicle applications. A headlamp for an automobile uses multiple light sources based on electro luminescence of semiconductor junctions. The proposed unique approach is to combine the lighting engineering function i.e. the correct light distribution, color spectrum and level necessary for the visual task at hand into the lamp such that the digital lamp obviates the need for additional light controls and fixtures. The digital electronic lamp utilizes ⅓ the energy and has over 100,000 hours lifetime versus 2000 for an automotive incandescent lamp and can be rapidly switched on and off without deleteriously affecting lifetime. (Quite the opposite, off time is not part of the lifetime). The multiple light-source, digital device, is an electronic headlight which provides the driver with the correct aiming, illumination level and distribution (e.g. parking |

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| 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 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 first area. | lights, low beam, high beam, lighting around curves and corners) based on input from the vehicle's speed, steering wheel position, turn signal indicator and detection of approaching headlights.<br><br>**51:43-52**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors<br><br>**52:62-53:4**<br>Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam. |

**45:52-57**

The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.

**19:17-30**

The basis of the invention is the use of a multitude of discrete light emitting sources ("digits") to generate light. The light control elements can be applied on a per junction basis or on a "white" color generating set grouping such as RGB or on a larger set which may be convenient for manufacturing or other color rendering considerations. The requirement for controllability is however, that the SLS output is definitive in relation to spectrum and spatial distribution.

The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand.

**53:13-37**

In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic

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| | or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED 277 at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14** |

There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims.

**52:54-53:4**

Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.

Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to

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| | follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14-22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>**45:27-44**<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will |

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| | control the luminance by varying the spatial light intensity distribution over the different surfaces.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 49. (New) The illuminating device of claim 48, wherein: | |
| the data includes image data; | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |
| 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; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand.<br><br>The digital headlamp solves this problem by automatically sensing the angle of the headlamp assembly and will employ in real time |

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| | only the properly aimed light sources to illuminate so as not to glare oncoming traffic. |
| the at least one object includes at least one of a pedestrian, a sign, or another vehicle; | **52:62-53:12**<br><br>Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>Wavelength specific SLSs in the infrared or near Ultra Violet spectrum, not visible to the driver by the unaided eye are used for communication between vehicles and roadway controllers or toll booths. Infrared SLS will provide radiation to be reflected from objects for night vision cameras. UV SLS are used for or illuminating UV fluorescent dyes in clothing bicycles and baby carriages to increase pedestrian visibility as is known in the art.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered |

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| | as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>95:3-14<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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, | 53:27-37<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |

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| 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; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| the at least one emission characteristic is different following modification by an optical control element; and | **25:5-9**<br>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. |
| the known aimings of light associated with the first cluster is based at least on part on known directionality of light emitted by LEDs of the first cluster exiting from the at least one headlamp. | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>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. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 50. (New) The illuminating device of | **51:43-47** |

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| claim 48, wherein the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to: | Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| identify an upcoming road curvature along a road on which the motor vehicle is traveling; and | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the headlamps. | **51:43-56**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |

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| 51. (New) 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; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| the at least one object includes at least one of a pedestrian, a sign, or another vehicle; | **52:62-53:12**<br>Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br>Wavelength specific SLSs in the infrared or near Ultra Violet spectrum, not visible to the driver by the unaided eye are used for |

communication between vehicles and roadway controllers or toll booths. Infrared SLS will provide radiation to be reflected from objects for night vision cameras. UV SLS are used for or illuminating UV fluorescent dyes in clothing bicycles and baby carriages to increase pedestrian visibility as is known in the art.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

**95:3-14**

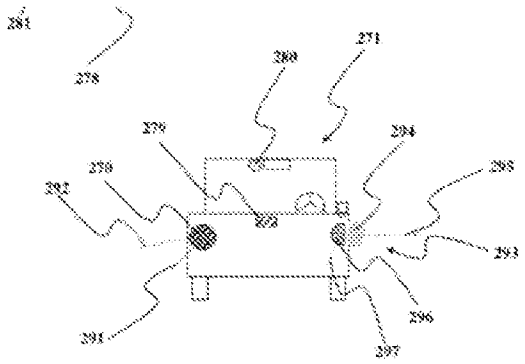
There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be

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| | covered by the invention without departing from the spirit or scope of the following claims. |
| 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; | **53:27-37**<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| 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; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| the at least one emission characteristic is different following modification by an optical control element; | **25:5-9**<br>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. |
| the known aimings of light associated with the first cluster is based at least on | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates |

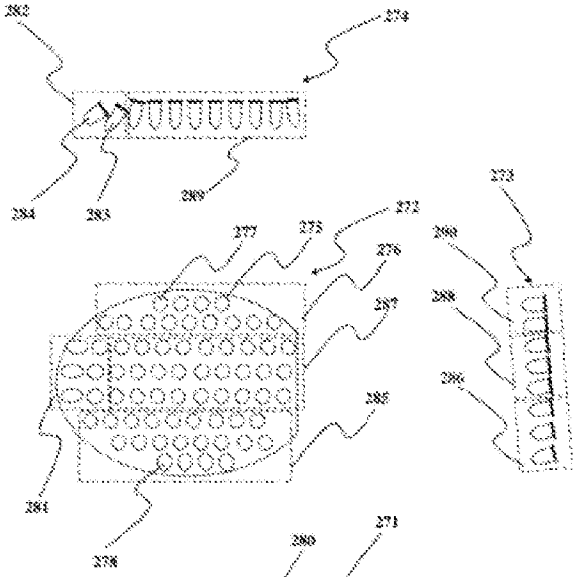
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| part on known directionality of light emitted by LEDs of the first cluster exiting from the at least one headlamp; and<br>the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller 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. | instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings |

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| | which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims.<br><br>~~51:51-56~~<br>At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location |
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| 52. (New) The illuminating device of claim 50, wherein the identification of the upcoming road curvature is based at least in part on map data and wherein the adaptation of the light pattern is based at least in part on the map data. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow |

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| | conditions etc. lighting can be adapted to the optimal operating regime. |
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| 53. (New) The illuminating device of claim 50, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 54. (New) The illuminating device of claim 48, further including one or more optical control elements to control light emitted from one or more of the LEDs. | **25:5-9**<br>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. |

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| 55. (New) The illuminating device of claim 54, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses. | **25:5-9**<br>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. |
| 56. (New) An illuminating device having automatic control of light provided to an illuminated area comprising: | **Claim 6 of the '551 Patent** |
| a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle; | **Claim 6 of the '551 Patent**<br><br>**Fig. 15 (bottom):**<br><br>  |

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| | **53:45-54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In |

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| | one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| 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; | **Claim 6 of the '551 patent**<br><br>**Fig. 15 (top):**<br>  |

**53:13-37**

In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.

**17:3-16**

As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes

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| | of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. |
| electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements; | **Claim 6 of the '551 patent** |
| one or more processors; | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. |
| one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or |

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| 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; | from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53-67**<br>Sensors **8** include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored |

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| arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and | parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … |
| memory storing instructions that, when executed by one or more processors of the controller, enable the controller to: | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |

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| determine, based on data from one or more of the sensors, a vertical and horizontal position associated with the at least one other vehicle; | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |
| 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 | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of |

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| | headlamps from oncoming vehicles and tail lamps from leading vehicles.<br><br>**52:62-53:4**<br>Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**19:17-30**<br>The basis of the invention is the use of a multitude of discrete light emitting sources ("digits") to generate light. The light control elements can be applied on a per junction basis or on a "white" color generating set grouping such as RGB or on a larger set which may be convenient for manufacturing or other color rendering considerations. The requirement for controllability is however, that |

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| | the SLS output is definitive in relation to spectrum and spatial distribution.<br><br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand.<br><br>**53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

**95:3-14**

There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims.

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| 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. | **50:37-56**<br>The digital lighting concept is extended to transportation vehicle applications. A headlamp for an automobile uses multiple light sources based on electro luminescence of semiconductor junctions. The proposed unique approach is to combine the lighting engineering function i.e. the correct light distribution, color spectrum and level necessary for the visual task at hand into the lamp such that the digital lamp obviates the need for additional light controls and fixtures. The digital electronic lamp utilizes ⅓ the energy and has over 100,000 hours lifetime versus 2000 for an automotive incandescent lamp and can be rapidly switched on and off without deleteriously affecting lifetime. (Quite the opposite, off time is not part of the lifetime). The multiple light-source, digital device, is an electronic headlight which provides the driver with the correct aiming, illumination level and distribution (e.g. parking lights, low beam, high beam, lighting around curves and corners) based on input from the vehicle's speed, steering wheel position, turn signal indicator and detection of approaching headlights.<br><br>**52:54-53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to |

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| | determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14-22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>**45:27-44**<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the |

luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces.

1:25-36

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

95:3-14

There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications

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| | which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 57. (New) The illuminating device of claim 56, wherein: | |
| the data includes image data; | 52:27-42<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |
| the control of emission of the first cluster includes a change of at least one of color or intensity or control of at least one LED | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and |

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| of the first cluster into a non-emitting state; | spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| 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; and | **53:27-37**<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| the known light aimings associated with the first cluster is based at least on part on known directionality of light emitted by LEDs of the first cluster exiting from the at least one headlamp. | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 58. (New) The illuminating device of | **51:43-47** |

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| claim 56 wherein the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to: | Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| identify an upcoming road curvature along a road on which the motor vehicle is traveling; and | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the headlamps. | **51:43-56**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |

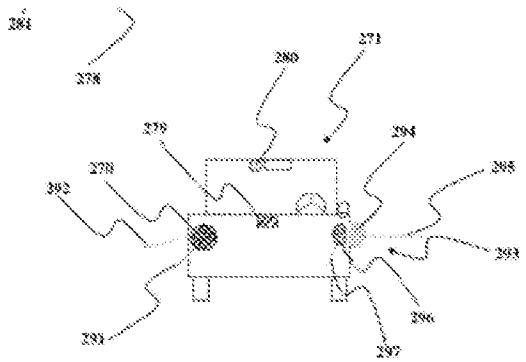
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| 59. (New) The illuminating device of claim 58, wherein: | |
| the control of emission of the first cluster includes a change of at least one of color or intensity or control of at least one LED of the first cluster into a non-emitting state; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| 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; | **53:27-37**<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| the known light aimings associated with the first cluster is based at least on part on known directionality of light | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which |

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| emitted by LEDs of the first cluster exiting from the at least one headlamp; and | will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such |

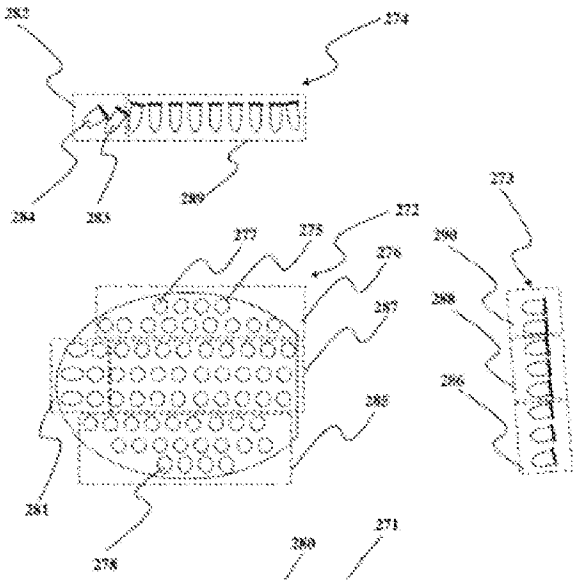
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| | changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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. | **51:51-56**<br>At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
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| 60. (New) The illuminating device of claim 58, wherein the identification of the upcoming road curvature | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous |

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| is based at least in part on map data and wherein the adaptation of the light pattern is based at least in part on the map data. | road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 61. (New) The illuminating device of claim 58, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |

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| 62. (New) The illuminating device of claim 56, further including one or more optical control elements to control light emitted from one or more of the LEDs. | **25:5-9**<br>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. |
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| 63. (New) The illuminating device of claim 62, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses. | **25:5-9**<br>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. |
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| 64. (New) An illuminating device having automatic control of light provided to an illuminated area comprising: | **Claim 6 of the '551 Patent** |
| a structure for incorporating illuminating device elements, wherein | **Claim 6 of the '551 Patent** |

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| the structure comprises a motor vehicle; | **Fig. 15 (bottom):**<br>  <br>**53:45-54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to |

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| | cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the | **Claim 6 of the '551 patent** |

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| structure, each headlamp including at least one of the LEDs and in communication with a power source; | **Fig. 15 (top):**<br>  <br>**53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. The concept cluster shown by the dashed lines, is used to describe a control function and is not |

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| | 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**17:3-16**<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. |
| electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements; | **Claim 6 of the '551 patent** |

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| one or more processors; | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. |
| 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; | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>25:53-67<br>Sensors 8 include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may |

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| | be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>... the external controller 279 which receives traffic data from sensors 280 ... |

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| memory storing instructions that, when executed by one or more processors of the controller, enable the controller to: | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| 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; | **53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.

**52:27-42**

A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles.

**45:45-57**

In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the

pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

**95:3-14**

There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings

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| | which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand.<br><br>The digital headlamp solves this problem by automatically sensing the angle of the headlamp assembly and will employ in real time only the properly aimed light sources to illuminate so as not to glare oncoming traffic<br><br>**52:54-53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to |

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| | determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14-22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>**45:27-44**<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the |

luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces.

1:25-36

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

95:3-14

There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications

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| | which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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 | **53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |

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| | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles.<br><br>**45:45-57**<br>In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| control a second, subsequent change, to one or more characteristics of the light that is subsequently directed | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and |

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| towards the other vehicle, that diminishes glare to the driver of the other vehicle when the other vehicle is at the second position. | spatial distribution of intensity and spectral distribution for the viewing task at hand.<br><br>The digital headlamp solves this problem by automatically sensing the angle of the headlamp assembly and will employ in real time only the properly aimed light sources to illuminate so as not to glare oncoming traffic<br><br>**19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand.<br><br>The digital headlamp solves this problem by automatically sensing the angle of the headlamp assembly and will employ in real time only the properly aimed light sources to illuminate so as not to glare oncoming traffic<br><br>**52:54 - 53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming |

vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.

Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.

**22:14-22**

In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.

**45:45-57**

In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and

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| | generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 65. (New) The illuminating device of claim 64, wherein: | |
| the first data or second data includes image data: | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |
| at least one of the first or second change to characteristics of light associated with at least one of the first or second cluster of LEDs includes at least one of a change to color, to intensity, or a change of at least one LED | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |

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| of the respective cluster to a non-emitting state; | |
| 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; and | **53:27-37**<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| the light that is directed or subsequently directed towards the other vehicle is determined based at least in part on known directionality of light emitted by the respective first or second cluster exiting the at least one headlamp. | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 66. (New) The illuminating device of claim 64, wherein the | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other |

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| memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to: | features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| identify an upcoming road curvature along a road on which the motor vehicle is traveling; and | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the headlamps. | **51:43-56**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |

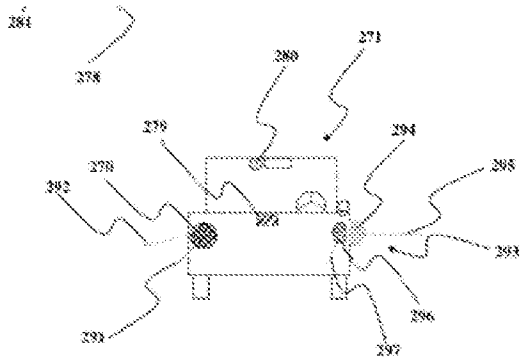
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| 67. (New) The illuminating device of claim 66, wherein: | |
| at least one of the first or second change to characteristics of light associated with at least one of the first or second cluster of LEDs includes at least one of a change to color, to intensity, or a change of at least one LED of the respective cluster to a non-emitting state; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| 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; | **53:27-37**<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |

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| the light that is directed or subsequently directed towards the other vehicle is determined based at least in part on known directionality of light emitted by the respective first or second cluster exiting the at least one headlamp; and | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. |
| 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. | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>**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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other |

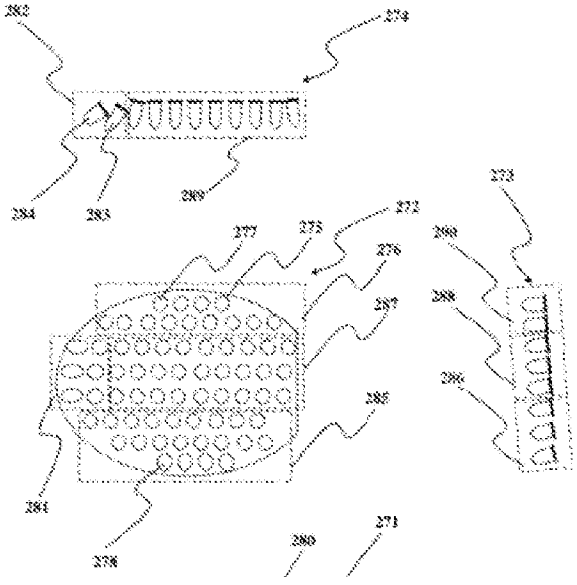
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| | radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 68. (New) The illuminating device of claim 66, wherein the identification of the upcoming road curvature is based at least in part on map data and wherein the adaptation of the light | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. |

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| pattern is based at least in part on the map data. | **25:5-9**<br>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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are |

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| | deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 69. (New) The illuminating device of claim 66, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data. | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
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| 70. (New) The illuminating device of claim 64, further including one or more optical control elements to control light emitted from one or more of the LEDs. | **25:5-9**<br>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. |
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| 71. (New) The illuminating device of claim 70, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses. | **25:5-9**<br>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. |
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| 72. (New) An illuminating device having automatic control of the light provided to an illuminated area comprising: | **Claim 6 of the '551 Patent** |
| a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle; | **Claim 6 of the '551 Patent**<br><br>**Fig. 15 (bottom):**<br><br>  |

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| | **53:45-54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In |

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| | one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| 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; | **Claim 6 of the '551 patent**<br><br>**Fig. 15 (top):**<br>  |

**53:13-37**

In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.

**17:3-16**

As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes

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| | of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. |
| electronic circuitry apparatus for the controlled powering of the LEDs and other elements of the illuminating device elements; | **Claim 6 of the '551 patent** |
| one or more processors; | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. |
| one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or |

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| 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; | from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53-67**<br>Sensors **8** include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored |

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| arranged to process the information communicated from the cameras and to automatically control the light provided to the illuminated area; and | parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … |
| memory storing instructions that, when executed by one or more processors of the controller, enable the controller to: | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |

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| determine a target based on first data from one or more of the sensors; | **45:45-67**<br>In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. It is to be understood that in a theater lighting application there is no need for a preprogrammed moving light using motors to change position. Instead a fixed DLF or ADLF with multiple light sources powers the necessary light sources to illuminate the performer as he or she moves about the stage. This actually is similar to the banks of shuttered lights used in present day stage lighting. Only now the digital aspect of discrete multiple light sources allowing for a smooth transition of aimings with instantaneous control of almost infinite variation of spectrum and intensity is accomplished.<br><br>**50:37-56**<br>The digital lighting concept is extended to transportation vehicle applications. A headlamp for an automobile uses multiple light sources based on electro luminescence of semiconductor junctions. The proposed unique approach is to combine the lighting engineering function i.e. the correct light distribution, color |

spectrum and level necessary for the visual task at hand into the lamp such that the digital lamp obviates the need for additional light controls and fixtures. The digital electronic lamp utilizes ⅓ the energy and has over 100,000 hours lifetime versus 2000 for an automotive incandescent lamp and can be rapidly switched on and off without deleteriously affecting lifetime. (Quite the opposite, off time is not part of the lifetime). The multiple light-source, digital device, is an electronic headlight which provides the driver with the correct aiming, illumination level and distribution (e.g. parking lights, low beam, high beam, lighting around curves and corners) based on input from the vehicle's speed, steering wheel position, turn signal indicator and detection of approaching headlights.

52:62-53:4

Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.

Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.

1:25-36

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating,

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| | night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>95:3-14<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| determine a first target location based on the first data; | 52:27-42<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal |

direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles.

**45:45-57**

In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered

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| | as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| select a cluster of the LEDs having light associated therewith that is directed at the target, determined based on the first target location; | **53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location |

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| | within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>52:27-42<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |

**45:45-57**

In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

**95:3-14**

There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and

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| | construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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 | **52:54-53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14-22:** |

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| | In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>45:27-44<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces. |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| maintain a variance of illumination provided to the target relative to the laterally adjacent areas, when subsequent data | **45:45-67**<br>In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a |

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| 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. | target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. It is to be understood that in a theater lighting application there is no need for a preprogrammed moving light using motors to change position. Instead a fixed DLF or ADLF with multiple light sources powers the necessary light sources to illuminate the performer as he or she moves about the stage. This actually is similar to the banks of shuttered lights used in present day stage lighting. Only now the digital aspect of discrete multiple light sources allowing for a smooth transition of aimings with instantaneous control of almost infinite variation of spectrum and intensity is accomplished.<br><br>**51:59-65**<br>Additional features include an optional concentrated flashlight type of beam to illuminate distant overhead and roadside signs, which due to the narrow directed beam will not blind oncoming traffic. Image recognition via a camera will allow the beam to follow the retroreflective sign as the vehicle moves or the signs will be provided with a special marker for this purpose.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of |

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| | lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>95:3-14<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
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| 73. (New) The illuminating device of claim 72, wherein: | |
| the variation of illumination provided to | **19:26-30** |

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| the target includes variation in at least one of color or intensity or at least a change of at least one LED of the selected cluster to a non-emitting state; | The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| the cluster includes a plurality of the LEDs and the cluster includes non-contiguous LEDs; | 53:27-37<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| the light directed at the target is determined based at least in part on known directionality of light emitted by the first cluster exiting from the at least one headlamp; and | 45:52-57<br>The controller 195, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>The direction of light exiting from the DLF as a whole or from each SLS individually is controllable by optical elements 6, such as |

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| | reflective surfaces and or refractors, and may be electronically variable optical elements.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |

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| at least one of the first data or the subsequent data includes image data. | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |
| | |
| 74. (New) The illuminating device of claim 72, wherein the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to: | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |

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| identify an upcoming road curvature along a road on which the motor vehicle is traveling; and | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the headlamps. | **51:43-56**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
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| 75. (New) The illuminating device of claim 74, wherein: | |
| the variation of illumination provided to | **19:26-30** |

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| the target includes variation in at least one of color or intensity or at least a change of at least one LED of the selected cluster to a non-emitting state, | The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| the selected cluster includes a plurality of the LEDs and the selected cluster includes non-contiguous LEDs; | **53:27-37**<br>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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. |
| the light directed at the target is determined based at least in part on known directionality of light emitted by the first cluster exiting from the at least one headlamp; and | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>The direction of light exiting from the DLF as a whole or from each SLS individually is controllable by optical elements **6**, such as |

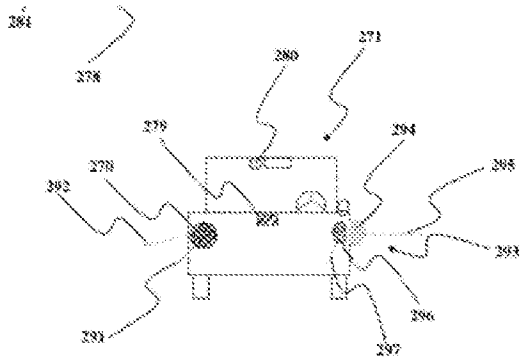
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| | reflective surfaces and or refractors, and may be electronically variable optical elements.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |

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| 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. | **51:51-56**<br>At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
| | |
| 76. (New) The illuminating device of claim 74, wherein the identification of the upcoming road curvature is based at least in part on map data and wherein the adaptation of the light | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of |

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| pattern is based at least in part on the map data | the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 77. (New) The illuminating device of claim 74, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 78. (New) The illuminating device of claim 72, further including | **25:5-9**<br>The direction of light exiting from the DLF as a whole or from each SLS individually is controllable by optical elements **6**, such as |

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| one or more optical control elements to control light emitted from one or more of the LEDs. | reflective surfaces and or refractors, and may be electronically variable optical elements. |
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| 79. (New) The illuminating device of claim 78 wherein the optical control elements include at least one of one or more reflectors, refractors or lenses. | **25:5-9**<br>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. |
| | |
| 80. (New) An illuminating device having automatic control of light provided to an illuminated area comprising: | **Claim 6 of the '551 Patent** |
| a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle; | **Claim 6 of the '551 Patent** |

**Fig. 15 (bottom):**



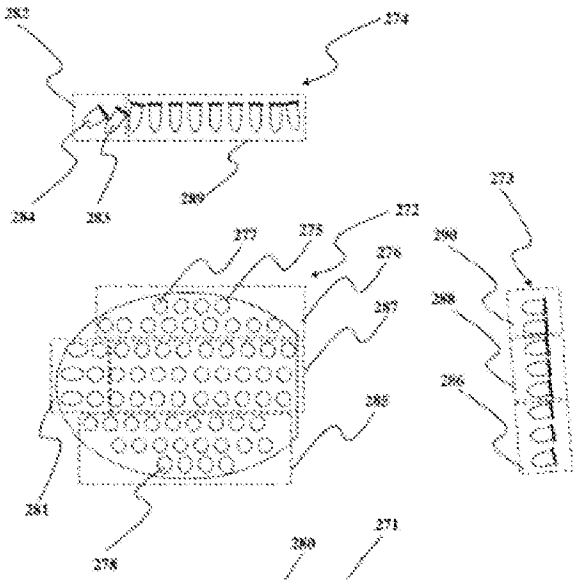

**53:45-54:47**

Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to

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| | cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| a plurality of individually controllable LEDs incorporated in the structure via at least one headlamp mounted to the | **Claim 6 of the '551 patent** |

structure, each headlamp including at least one of the LEDs, the LEDs in communication with a power source;

**Fig. 15 (top):**



**53:13-37**

In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. The concept cluster shown by the dashed lines, is used to describe a control function and is not

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| | 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**17:3-16**<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. |
| electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements; | **Claim 6 of the '551 patent** |

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| one or more processors; | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. |
| 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; | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53-67**<br>Sensors 8 include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may |

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| | be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. |
| 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 | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … |

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| memory storing instructions that, when executed by one or more processors of the controller, enable the controller to: | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. |
| 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 | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |

**45:45-57**

In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

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| | 95:3-14<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| 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. | 52:27-42<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |

**45:45-57**

In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.

**52:54-53:4**

Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.

Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent

of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.

**22:14-22**

In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.

45:27-44

In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be

used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces.

**51:59-65**

Additional features include an optional concentrated flashlight type of beam to illuminate distant overhead and roadside signs, which due to the narrow directed beam will not blind oncoming traffic. Image recognition via a camera will allow the beam to follow the retroreflective sign as the vehicle moves or the signs will be provided with a special marker for this purpose.

**1:25-36**

The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.

**95:3-14**

There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention

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| | will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 81. (New) The illuminating device of claim 80, wherein: | |

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| the data includes image data; | **52:27-42**<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. |
| the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to select a first cluster of LEDs, associated with the first light, for the change, based at least in part on known aimings of the first light associated with the first | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**25:5-9**<br>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. |

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| cluster having a correlation to the at least the portion, the known aimings based at least in part on at least one of known directionality of light emitted by the first cluster or known directionality of light emitted by the first cluster exiting the headlamp; and | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| the change to emission of the one or more LEDs aimed towards the at least the portion includes a | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and |

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| change to intensity or color or a change of at least one of the LEDs to a non-emitting state. | spatial distribution of intensity and spectral distribution for the viewing task at hand. |
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| 82. (New) The illuminating device of claim 80, wherein the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to: | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| identify an upcoming road curvature along a road on which the motor vehicle is traveling; and | **51:43-47**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. |
| accommodate the upcoming road curvature by adaptation of a light pattern of at least one of the at least one headlamps. | **51:43-56**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. In these systems the light distribution |

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| | pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
| | |
| 83. (New) The illuminating device of claim 82, wherein: | |
| the change to emission of the one or more LEDs aimed towards the at least the portion includes a change to intensity or color or a change of at least one of the LEDs to a non-emitting state; | **19:26-30**<br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. |
| the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to select a first | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. |

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| cluster of LEDs, associated with the first light, for the change, based at least in part on known aimings of the first light associated with the first cluster having a correlation to the at least the portion, the known aimings based at least in part on at least one of known directionality of light emitted by the first cluster or known directionality of light emitted by the first cluster exiting the headlamp; and | **25:5-9**<br>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.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are |

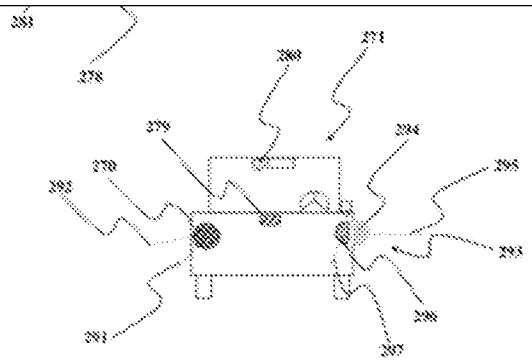
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| | deemed to be covered by the invention without departing from the spirit or scope of the following claims. |
| the memory further stores instructions that, when executed by one or more processors of the controller, enable the controller to accommodate 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. | **51:51-56**<br>At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. |
| | |
| 84. (New) The illuminating device of claim 82, wherein the identification of the upcoming road curvature is based at least in part on map data and wherein the | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any |

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| adaptation of the light pattern is based at least in part on the map data. | instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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| 85. (New) The illuminating device of claim 82, wherein the identification of the upcoming road curvature is based at least in part on sensor data provided by one or more of the sensors of the vehicle and wherein the adaptation of the light pattern is based at least in part on the sensor data. | **51:43-57**<br>Present advances in automobile lighting include Adaptive Frontal-lighting Systems which aid in seeing around curves and other features in the road. In these systems the light distribution pattern and color spectrum will be changed according to the instantaneous road conditions at hand. Thus, the headlamp now has much more flexibility than the high beam/low beam variation of today. At any instant in time the intensity, spectrum and beam pattern of the headlamp may be varied as a function of the drivers intent, lay of the road and environmental factors. A GPS system on the car may also let the headlamps system know of curves up ahead, one way traffic and others factors such the headlamp may be operated in the optimal mode at that instantaneous location. With sensors sensitive to environmental surroundings such as ambient light, fog or snow conditions etc. lighting can be adapted to the optimal operating regime. |
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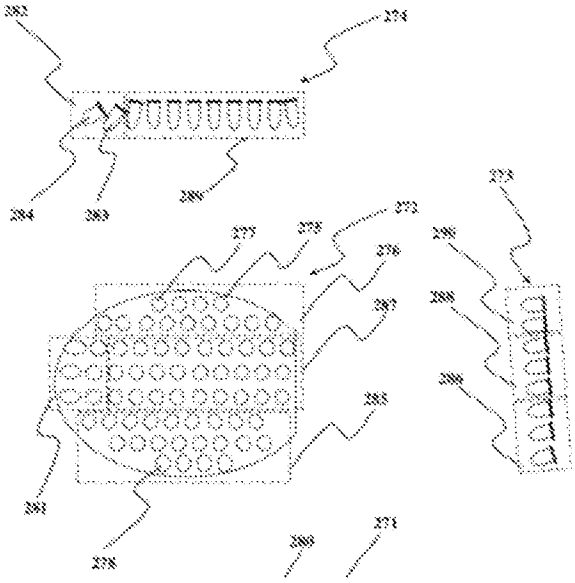
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| 86. (New) The illuminating device of claim 80, further including one or more optical control elements to control light emitted from one or more of the LEDs. | **25:5-9**<br>The direction of light exiting from the DLF as a whole or from each SLS individually is controllable by optical elements **6**, such as reflective surfaces and or refractors, and may be electronically variable optical elements. |
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| 87. (New) The illuminating device of claim 86, wherein the optical control elements include at least one of one or more reflectors, refractors or lenses. | **25:5-9**<br>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. |

# Exhibit OTH-E
## Industry Praise Nexus Support

| Claims – 9,955,551 | 112 Support | Industry Praise |
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| *Claim 6* | | |
| *An illuminating device having automatic control of the light provided to an illuminated area comprising:* | **Claim 6 of the '551 Patent** | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers." (Ex. 10, PR Newswire at 1, emphasis added.)<br><br>*See* Ex. OTH-A, "Stam Decl." at ¶107-108. |
| *a structure for incorporating illuminating device elements;* | **Claim 6 of the '551 Patent**<br><br>**Fig. 15 (bottom):** | The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. (Ex. 10 at 1, emphasis added.)<br><br>*See* Ex. OTH-A at ¶107, 109. |

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| |  <br><br>**53:45 – 54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the | |

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| | vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with | |

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| | fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. | |
| *one or more light sources incorporated in the structure and in communication with a power source;* | **Claim 6 of the '551 patent**<br><br>**Fig. 15 (top):**<br>  <br><br>**53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers." (Ex.10 at 1, emphasis added.)<br><br>A POSITA "would readily understand that such an automatically adjustable system would include |

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| | such as an LED 275 with specific location within the cluster 276 has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED 277 at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. | individually controllable LEDs in communication with a power source." *See* Ex. OTH-A at ¶107, 110. |

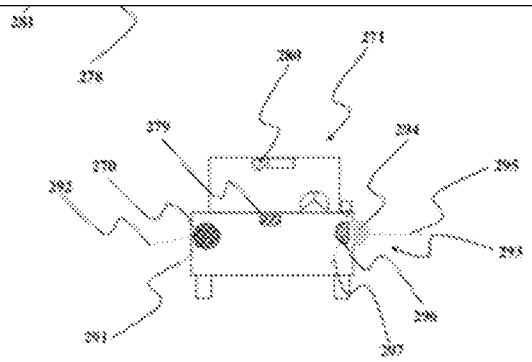
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| | 17:3-16<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. | |
| *electronic circuitry apparatus for the controlled powering of the light source and other illuminating device elements;* | **Claim 6 of the '551 patent** | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time |

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| | | traffic conditions to reduce glare for other drivers." (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>"[F]rom the described functionality, it's clear that the praise is directed to an illuminating device, including *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements*." (Ex. OTH-A at ¶107,111.) |
| *one or more cameras placed on the structure for detecting coordinate-specific information about the illuminated area, said camera in communication with* | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from | "The **new Matrix Beam system combines a front camera**, high-performance software and "intelligent lighting" technology **to recognize cars that are being followed as well as** |

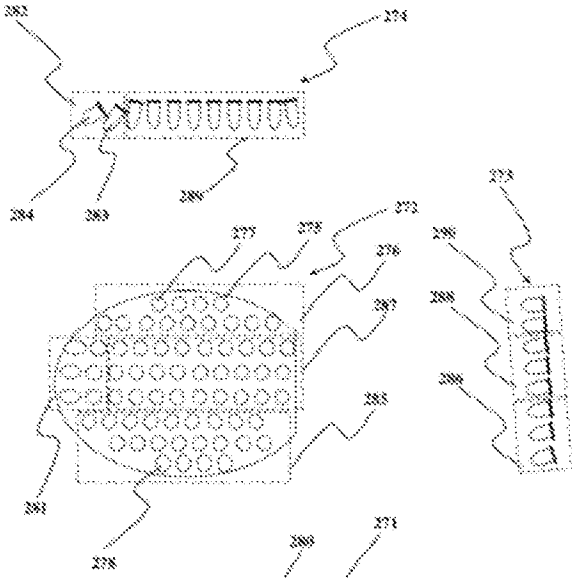
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| *power and control device elements;* | manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit **7** has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53-67**<br>Sensors **8** include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. | **oncoming traffic**." (Ex. 10 at 1, emphasis added 1.)<br><br>"[F]rom this sentence, it's clear to a person skilled in the art that the industry praise is directed to an illuminating device that includes the details of the camera sensor limitation." (Ex. OTH-A at ¶107, ¶112.) |

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| *a controller integrated with the structure, in communication with the light source controlling power circuitry, said controller arranged to processes the information communicated from the camera and automatically control the light provided to the illuminated area.* | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS. | A leader in automotive lighting and electronics, HELLA's "glare-free high-beam" headlights use **individually controlled LEDs that adjust automatically to real-time traffic conditions** to reduce glare for other drivers. (Ex. 10 at 1, emphasis added.)<br><br>**The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic**. *Id*<br><br>**The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions**." *Id.*<br><br>"[F]rom the above sentences, and the inherent knowledge possessed by a person skilled |

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| | 53:48-50<br>… the external controller 279 which receives traffic data from sensors 280 … | in the art, it's clear that the industry praise is directed to an illuminating device that includes the details of the controller limitation, wherein the controller processes information from the camera". (Ex. OTH-A at ¶107, 113.) |
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| *Claim 24 (New)* | | |
| *An illuminating device having automatic control of light provided to an illuminated area comprising:* | **Claim 6 of the '551 Patent** | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers." (Ex. 10 at 1, emphasis added.)<br><br>*See* Ex. OTH-A at ¶107-108. |
| *a structure for incorporating illuminating device elements, wherein the* | **Claim 6 of the '551 Patent**<br><br>**Fig. 15 (bottom):** | The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or |

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| *structure comprises a motor vehicle;* |  <br><br>**53:45 – 54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the | switching on and off light sources based on traffic conditions. (Ex. 10 at 1, emphasis added.)<br><br>*See* Ex. OTH-A at ¶107, 109. |

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| | vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with | |

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| | fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. | |
| *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;* | **Claim 6 of the '551 patent**<br><br>**Fig. 15 (top):**<br>  <br><br>**53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers." (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or switching on and off light |

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| | such as an LED 275 with specific location within the cluster 276 has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED 277 at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous. | sources based on traffic conditions. *Id.*<br><br>A POSITA "would readily understand that such an automatically adjustable system would include individually controllable LEDs in communication with a power source". *See* Ex. OTH-A at ¶107. |

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| | 17:3-16<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. | |
| *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;* | **Claim 6 of the '551 patent** | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time |

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| | | traffic conditions to reduce glare for other drivers." (Ex. 10 at 1, emphasis addedp. 1.)<br><br>The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>"[F]rom the described functionality, it's clear that the praise is directed to an illuminating device, including *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements*." (Ex. OTH-A at ¶107, ¶111.) |
| *one or more processors;* | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be | |

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| | broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. | |
| *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;* | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53 – 67**<br>Sensors 8 include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the | "The **new Matrix Beam system combines a front camera**, high-performance software and "intelligent lighting" technology **to recognize cars that are being followed as well as oncoming traffic**." (Ex. 10 at 1, emphasis added.)<br><br>""[F]rom this sentence, it's clear to a person skilled in the art that the industry praise is directed to an illuminating device that includes the details of the camera sensor limitation." (Ex. OTH-A at ¶107, ¶112.) |

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| | intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. | |
| *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* | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out | A leader in automotive lighting and electronics, HELLA's "glare-free high-beam" headlights use **individually controlled LEDs that adjust automatically to real-time traffic conditions** to reduce glare for other drivers. (Ex. 10 at 1, emphasis added.)<br><br>**The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic**. *Id.* |

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| | intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … | **The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions**. *Id.*<br><br>'[F]rom the above sentences, and the inherent knowledge possessed by a person skilled in the art, it's clear that the industry praise is directed to an illuminating device that includes the details of the controller limitation, wherein the controller processes information from the camera". (Ex. OTH-A at ¶107, ¶.) |
| *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:* | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and | The new Matrix Beam system combines a front camera, **high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic**. (Ex. 10 at 1, emphasis added.) |

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| | maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. | The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>**Individually controlled LEDs also provide two or more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.** *Id.*<br><br>From the above sentences and the inherent knowledge of a person skilled in the art, "in order to implement the 'high performance software' it's clear that *memory storing instructions* would necessarily be provided. (Ex. OTH-A at ¶107, ¶114). |
| *determine first coordinates corresponding to an other vehicle, based on* | **45:53-55**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light | "[F]rom the above sentences and the inherent knowledge of a person skilled in the art, it's clear that the industry praise is directed to an |

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| *the coordinate-specific information;* | sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**12:5-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**52:54-65**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such | illuminating device that determines the position of at least one other vehicle". (Ex. OTH-A at ¶107, ¶115). |

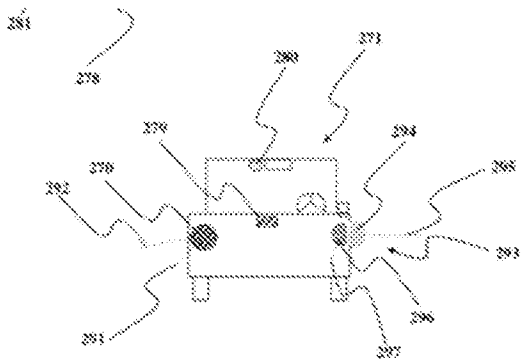
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| | a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. | |
| *select a cluster of the LEDs that emit light toward at least a* | **45:53-55**<br>The controller **195**, based on the camera input runs the pattern recognition routines, | The new Matrix Beam system combines a front camera, high-performance software |

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| *portion of the other vehicle based on the LEDs having emission aimings associated with the first coordinates;* | derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**52:54-65**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night | and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic. (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>**Individually controlled LEDs also provide two or more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.** *Id.*<br><br>From the above sentences and the inherent knowledge of a person skilled in the art, "an illuminating device that includes "individually controlled LEDs" necessarily selects the LEDS to be aimed based on the position of the |

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| | vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. | detected vehicle, per the *select a cluster* limitation". (Ex. OTH-A at ¶107, ¶116). |

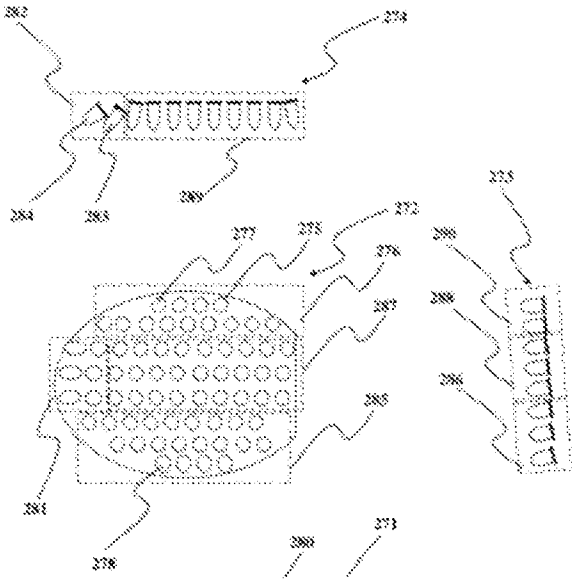
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| *change emission of the selected cluster of LEDs relative to emission of other LEDs not included in the cluster to create headlamp illumination that preserves a first level of illumination illuminating past the other vehicle while preventing glare to a driver of the other vehicle.* | **45:53-55**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**52:54-65**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More | The two-or-more dark zones with 'light in-between' correspond to the "first coordinates" and "preserved area of illumination" to prevent glare to a driver of the other vehicle, which as the article states provides a safer driving experience. (Ex. 10 at 1, emphasis added.)<br><br>"[F]rom the above sentences it would be clear to a person skilled in the art that the industry praise description of an illuminating device with "two or more dark zones with 'light-in-between" to maximize visibility, corresponds to the above-identified claim limitation, providing reduced illumination in the dark zones relative to the illumination on both sides of the dark zone." *See,* OTH-A at ¶107, ¶117. |

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| | particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention | |

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| | without departing from the spirit or scope of the following claims. | |
| *Claim 32* | | |
| *An illuminating device having automatic control of light provided to an illuminated area comprising:* | **Claim 6 of the '551 Patent** | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers." (Ex. 10 at 1, emphasis added.)<br><br>*See* Ex. OTH-A at ¶107-108. |
| *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | **Claim 6 of the '551 Patent**<br><br>**Fig. 15 (bottom):**<br><br>  | The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. (Ex. 10, PR Newswire at 1, emphasis added.)<br><br>*See* Ex. OTH-A at ¶107, ¶109. |

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| | **53:45 – 54:47**<br>Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to | |

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| | cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses | |

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| | the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. | |
| *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;* | **Claim 6 of the '551 patent**<br><br>**Fig. 15 (bottom):**<br>  <br><br>**53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers"<br>The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. (Ex. 10 at 1, emphasis added.)<br><br>A POSITA "would readily understand that such an automatically adjustable system would include |

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| | one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED 277 at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**17:3-16**<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in | individually controllable LEDs in communication with a power source". *See* Ex. OTH-A at ¶107, ¶110. |

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| | response to the signal. Thus, the term "light source" should be understood to include light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. | |
| *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;* | **Claim 6 of the '551 patent** | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers." (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a **car's headlamps** to |

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| | | deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>From the described functionality, "it's clear that the praise is directed to an illuminating device, including *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements*." (Ex. OTH-A at ¶107, ¶111.) |
| *one or more processors;* | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. | |
| *one or more sensors, including one or more cameras, placed on the structure for detecting* | **Claim 6 of the '551 patent**<br><br>**25:34-42** | "The **new Matrix Beam system combines a front camera**, high-performance software and "intelligent |

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| *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;* | In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors **8**, or from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53-67**<br>Sensors **8** include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array | lighting" technology **to recognize cars that are being followed as well as oncoming traffic**." (Ex. 10 at 1, emphasis added.)<br><br>"[F]rom this sentence, it's clear to a person skilled in the art that the industry praise is directed to an illuminating device that includes the details of the camera sensor limitation." (Ex. OTH-A at ¶107, ¶112.) |

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| | and may be monochromatic or color as in a monochromatic or digital camera. Such arrays are readily available in mega-pixel resolution. | |
| *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* | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are | A leader in automotive lighting and electronics, HELLA's "glare-free high-beam" headlights use **individually controlled LEDs that adjust automatically to real-time traffic conditions** to reduce glare for other drivers. (Ex. 10 at 1, emphasis added.)<br><br>**The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic**. (Ex. 10, at 1, emphasis added.)<br><br>**The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light** |

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| | checked against the stored parameters and the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … | **sources based on traffic conditions**. *Id.*<br><br>"[F]rom the above sentences, and the inherent knowledge possessed by a person skilled in the art, it's clear that the industry praise is directed to an illuminating device that includes the details of the controller limitation, wherein the controller processes information from the camera". (Ex. OTH-A at ¶107, ¶113.) |
| *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:* | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47** | The new Matrix Beam system combines a front camera, **high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic.** (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light |

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| | The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently such that each lamp performs its functions separately. | sources based on traffic conditions. *Id.*<br><br>**Individually controlled LEDs also provide two or more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.** *Id.*<br><br>"From the above sentences, it's clear that the industry praise is directed to an illuminating device that includes the '*memory storing instructions*' limitation". (Ex. OTH-A at ¶107, ¶114.) |
| *create a beam of diminished illumination illuminating at least a portion of the at least one target with non-glaring illumination, created within a broader field of illumination having different intensity than the beam, by one or more changes to* | **52:54 - 53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. | |

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| *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, the beam diminished in intensity relative to the broader field of illumination illuminating at least above and on both sides of the beam; and* | Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14-22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting. | |

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| | 22:26-48<br>In another example of prior art practice a table lamp for reading is provided with a shade. The shade is there to partially redirect the light onto the book and also prevent direct, glaring, rays from the lamp used for general lighting from reaching the reader's eyes. According to the present invention, instead of having a glaring lamp producing light which is then made non-glaring by a shade at a loss in excess of 50% the LF is built such the amounts of light directed downward at useful angles and the amount of light directed upward are in the correct ratio. The surface area, from which discomfort-glare causing rays exit, is designed such that the luminous exitance is within recommended UGR levels for home use. The fixture has no need for a shade to protect from glare, the glare was never produced at those angles to begin with due to proper geometric design. To get the desired luminous exitance expressed in terms of lumen per sq. meter or luminance in terms of candela per sq. meter, the light exiting the source of specific intensity at angles which normally reach the room occupant's eyes, is spread over an area such that the exiting light is non-glaring. These lighting design parameters serve as the product specification and are incorporated | |

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| | into the initial design. There is no need to add on components to achieve correct lighting.<br><br>45:27-44<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces. | |

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| | **1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such | |

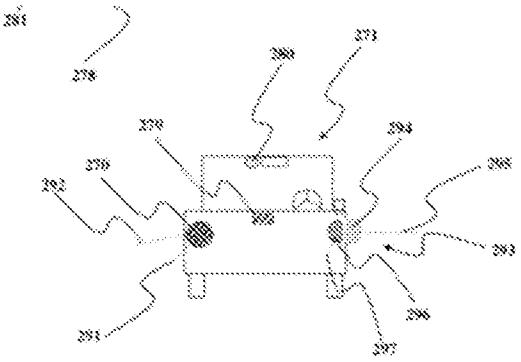
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| | changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. | |
| *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.* | **45:45-67**<br>In another embodiment using the camera **197**, the controller **195** is instructed to identify and track a roving speaker during a video presentation. A signaling device is used by the speaker to allow the pattern recognition program to initially lock-on and recognize a target attribute as is known in the art of object tracking. The signaling device can be a laser light pointer **202** aimed at the camera or a hand held remote control **201** in communication with the camera vision system. The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room. It is to be understood that in a theater lighting application there is no need for a preprogrammed moving light using motors to change position. Instead a fixed DLF or ADLF with multiple light | "The **new Matrix Beam system combines a front camera**, high-performance software and "intelligent lighting" technology **to recognize cars that are being followed as well as oncoming traffic**." (Ex. 10, at 1, emphasis added.)<br><br>**Individually controlled LEDs also provide two or more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.** *Id*<br><br>A POSITA would readily understand that the high performance software that successfully recognized cars that are being followed, |

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| | sources powers the necessary light sources to illuminate the performer as he or she moves about the stage. This actually is similar to the banks of shuttered lights used in present day stage lighting. Only now the digital aspect of discrete multiple light sources allowing for a smooth transition of aimings with instantaneous control of almost infinite variation of spectrum and intensity is accomplished.<br><br>**51:59-65**<br>Additional features include an optional concentrated flashlight type of beam to illuminate distant overhead and roadside signs, which due to the narrow directed beam will not blind oncoming traffic. Image recognition via a camera will allow the beam to follow the retroreflective sign as the vehicle moves or the signs will be provided with a special marker for this purpose.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered | would necessarily follow the target to result in the "dark zones". (Ex. OTH-A at ¶107, ¶115, ¶117.) |

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| | as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>95:3-14<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. | |
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| Claim 56 | | |

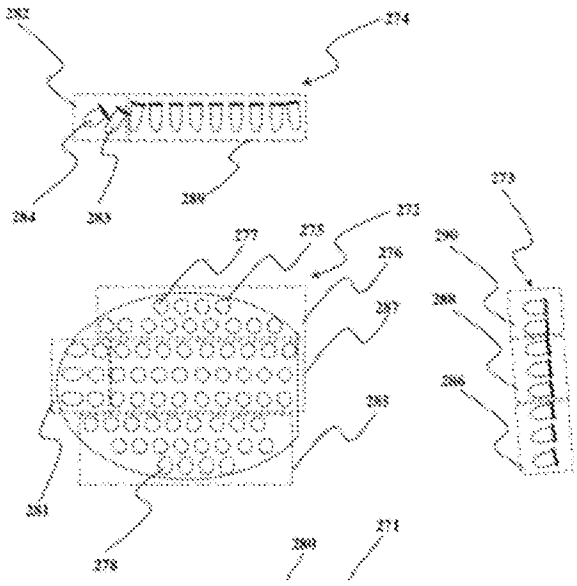


Mercedes EX1010, Part 2 of 3
U.S. Patent No. 9,955,551

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| *An illuminating device having automatic control of light provided to an illuminated area comprising:* | **Claim 6 of the '551 Patent** | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers" (Ex. 10 at 1, emphasis added.)<br><br>*See* OTH-A at ¶107-¶108 |
| *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | **Claim 6 of the '551 Patent**<br><br>**Fig. 15 (bottom):**<br><br>  <br><br>**53:45 – 54:47** | The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. (Ex. 10at1, emphasis added.)<br><br>*See* Ex. OTH-A at ¶107, ¶109 |

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| | Thus when following another vehicle, assuming, as drivers have reported, that they find yellow incandescent colored headlamps less offending than the HID blue-white color, the external controller **279** which receives traffic data from sensors **280** … a cluster **281** would be used to illuminate around a corner. Thus when the turn indicator has been selected or the steering wheel has been rotated by the driver, the DLF headlamp is powered by the controller to illuminate sideways at angles which according to the speed of travel is correct. (A driver can't make a 90-degree turn traveling 90 kph but from a stop, the turn may be around a corner.) In a preferred embodiment a multitude of LEDs in **281** are differently aimed in top view **274** showing the top view of the cluster **282** with SLS **283** angled less outwards and SLS **284** angled more outward with the forward aiming (distance ahead of the vehicle) of the more angled SLS **284**, closer in for illuminating sharp turn, than that of the less angled SLS **283** for a shallow curve. Side sectional view **273** shows a general downward aiming with SLSs of front view **272** cluster **285** corresponding to cluster **286** shown from the side. The cluster **286** is the most angled downward such as for a slow driving as in a parking | |

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| | light type of application where the idea is not to cause glare yet be seen. The parking light function can also be done with higher angled LEDs by just lowering the intensity to very low non-glaring intensities. Cluster **287** of the front view would be the main illuminating workhorse and is shown in side view **273** as angled SLSs in cluster **288** and top view **274** as cluster **289**. The top cluster **276** shown in side view **273**, as **290** would perform alone or in tandem with part of **287** the high beam lighting function… In one embodiment the digital headlamp carries out all the functions in a single unit **270**. SLSs have different locations and aimings **291** and **292** to carry out the functions. In another embodiment **293** the spotlight sign illuminating function or corner lighting function is in a separate package **294** with its aiming **295**. The low and high beam lighting is accomplished with fixture **296** and its general aiming **297**. The separate units may be dictated by design or sales considerations and yield more flexibility but are within the scope of the overall integral digital lamp headlight device. The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently | |

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| | such that each lamp performs its functions separately. | |
| *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;* | **Claim 6 of the '551 patent**<br><br>**Fig. 15 (top):**<br>  <br><br>**53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers." (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>A POSITA "would readily understand that such an automatically adjustable system would include individually controllable |

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| | spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**17:3-16**<br>As used herein, the term "light source", LED or "solid state light source" means any system that is capable of receiving an electrical signal and producing light in response to the signal. Thus, the term "light source" should be understood to include | LEDs in communication with a power source". *See* Ex. OTH-A at ¶107, 110. |

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| | light emitting diodes of all types, light emitting polymers, semiconductor dies that produce or emanate light in response to current, organic LEDs, electro-luminescent strips, and other such systems. Incandescent and discharge light sources are also included and multiples of incandescent and discharge light sources also provide a digital luminaire. In an embodiment, a "light source" may refer to a single light emitting diode package including multiple semiconductor LED dies that are individually controlled. | |
| *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements;* | **Claim 6 of the '551 patent** | HELLA "has won the prestigious 2014 Automotive News PACE Award for its industry-first adaptive LED Matrix Beam technology. . . HELLA's "glare-free high-beam" **headlights use individually controlled LEDs that adjust automatically** to real-time traffic conditions to reduce glare for other drivers." (Ex. 10 at 1, emphasis added. 1.)<br><br>The system automatically adjusts a **car's headlamps** to deliver "glare free" illumination, dimming or |

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| | | switching on and off light sources based on traffic conditions. *Id.*<br><br>From the described functionality, "it's clear that the praise is directed to an illuminating device, including *electronic circuitry apparatus for the controlled powering of the LEDs and other of the illuminating device elements"*. (Ex. OTH-A at ¶107, ¶111.) |
| *one or more processors;* | **18:23-29**<br>In a preferred embodiment the DLF is provided with an onboard controller. The controller may be a computer board, embedded device, a Digital Signal Processor, etc. In general, the term "logical controller, controller or computer" can be broadly defined to encompass any device having control circuitry or a processor which executes instructions from a memory medium. | |
| *one or more sensors, including one or more cameras, placed on the structure for detecting coordinate-specific information about the* | **Claim 6 of the '551 patent**<br><br>**25:34-42**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives | "The **new Matrix Beam system combines a front camera**, high-performance software and "intelligent lighting" technology **to recognize cars that are** |

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| *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;* | input and/or feedback from motion, intensity and/or spectral sensors **8**, or from manual control button **9** and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range.<br><br>**25:53-67**<br>Sensors **8** include any of the following: light, temperature and motion detection devices. Two types of optical detection sensors may be used: A photo detector with specific spectral sensitivity to detect a specific color. For example a standard red, blue and green set which would then indicate how "white" the light is. Alternately, a wide spectrum photo detector that irrespective of color measures the intensity of each excited die as it is test fired, based on the eye visual sensitivity curve. The optical sensor may be lensed and capable of forming an image, that is a camera and the detector may be a detector array of photodiode pixels. The detector array may be a CMOS or CCD VSLI array and may be monochromatic or color as in a monochromatic or digital camera. Such | **being followed as well as oncoming traffic**." (Ex. 10, at 1, emphasis added.)<br><br>"[F]rom this sentence, it's clear to a person skilled in the art that the industry praise is directed to an illuminating device that includes the details of the camera sensor limitation." (Ex. OTH-A at ¶107, ¶112.) |

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| | arrays are readily available in mega-pixel resolution. | |
| *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* | **Claim 6 of the '551 patent**<br><br>**25:34-52**<br>In a preferred embodiment the DLF contains logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. Measured parameters are checked against the stored parameters and | A leader in automotive lighting and electronics, HELLA's "glare-free high-beam" headlights use **individually controlled LEDs that adjust automatically to real-time traffic conditions** to reduce glare for other drivers. (Ex. 10 at 1, emphasis added.)<br><br>**The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic.** *Id.*<br><br>**The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions**." *Id.* |

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| | the control circuitry adjusts the power to SLS.<br><br>**53:48-50**<br>… the external controller **279** which receives traffic data from sensors **280** … | "From the above sentences, and the inherent knowledge possessed by a person skilled in the art, it's clear that the industry praise is directed to an illuminating device that includes the details of the controller limitation, wherein the controller processes information from the camera." (Ex. OTH-A at ¶107, ¶113.) |
| *memory storing instructions that, when executed by one or more processors of the controller, enable the controller to:* | **25:42-50**<br>The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications.<br><br>**54:45-47**<br>The controller **279** will addresses the power supply of each DLF headlamp **270**, **296** and **294** independently | The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic. (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>**Individually controlled LEDs also provide two or** |

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| | such that each lamp performs its functions separately. | **more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.** (Ex. 10 at 1, emphasis added.)<br><br>"From the above sentences and the inherent knowledge of a person skilled in the art, in order to implement the 'high performance software' it's clear that *memory storing instructions* would necessarily be provided." (Ex. OTH-A at ¶107, ¶114). |
| *determine, based on data from one or more of the sensors, a vertical and horizontal position associated with the at least one other vehicle;* | 52:27-42<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including | The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic. (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or |

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| | horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles. | switching on and off light sources based on traffic conditions. *Id.*<br><br>**Individually controlled LEDs also provide two or more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.** *Id.*<br><br>"[F]rom the above sentences and the inherent knowledge of a person skilled in the art, it's clear that the industry praise is directed to an illuminating device that determines the position of at least one other vehicle." (Ex. OTH-A at ¶107, ¶115). |
| *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* | 52:27-42<br>A possible control system for such purposes is described in U.S. Pat. No. 6,281,632 by Stam, et-al from Aug. 28, 2001 titled: A Continuously variable headlamp control incorporated herein by reference. The patent describes how continuously variable headlamps offer greater flexibility for roadway illumination but offer challenges in | The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic. (Ex. 10 at 1, emphasis added.) |

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| | automatic control design. Each continuously variable headlamp has an effective illumination range varied by changing at least one parameter from a set including horizontal direction aimed, vertical direction aimed, and intensity emitted. Stam discloses a system for automatically controlling continuously variable headlamps on a controlled vehicle includes an imaging system capable of determining lateral and elevational locations of headlamps from oncoming vehicles and tail lamps from leading vehicles.<br><br>52:62 – 53:4<br>Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam. | The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>**Individually controlled LEDs also provide two or more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.** *Id.*<br><br>"It is my opinion that, from the above sentences and the inherent knowledge of a person skilled in the art, an illuminating device that includes 'individually controlled LEDs' necessarily selects the LEDS to be aimed based on the position of the detected vehicle, per the *select a cluster* limitation." (Ex. OTH-A at ¶107, ¶116). |

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| | **45:52-57**<br>The controller **195**, based on the camera input runs the pattern recognition routines, derives the coordinates and generates instructions to drive the specific light sources with aimings which will project light at the speaker as the speaker move about the room.<br><br>**19:17-30**<br>The basis of the invention is the use of a multitude of discrete light emitting sources ("digits") to generate light. The light control elements can be applied on a per junction basis or on a "white" color generating set grouping such as RGB or on a larger set which may be convenient for manufacturing or other color rendering considerations. The requirement for controllability is however, that the SLS output is definitive in relation to spectrum and spatial distribution.<br><br>The discrete light emitting elements by operating and not operating, at full power or at a fraction of, either partially or in unison, generate light with optimal intensity, spectral distribution, and spatial distribution of intensity and spectral distribution for the viewing task at hand. | |

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| | **53:13-37**<br>In FIG. 16 a headlamp **270** of a land, sea or air vehicle **271** is shown in front view **272**, side view of a section **273** and top view of a section **274**. A discreet SLS light source such as an LED **275** with specific location within the cluster **276** has a specific spatial light distribution, color wavelength and aiming relative to the vehicle, such as straight ahead, and or downwards and or off towards the right or left. The SLS may have one junction and be monochromatic or have a many junctions and provide a wide spectral power distribution and the power to the SLS may be varied. An SLS can also be a "white" LED. For example a typical "white" LED such as a Luxeon® white LED such as LXHL-XXXX will have a colder "bluish" 4,500K color temperature. LED **277** at a second location within the same cluster may have a similar or dissimilar aiming, wavelength and spatial light distribution. 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 | |

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| | a second cluster **278** which may provide a parking light function. The same SLS may be used, albeit at different intensities, for both the above functions and thus clusters may overlap and be discontinuous.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of | |

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| | the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. | |
| *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.* | **50:37-56**<br>The digital lighting concept is extended to transportation vehicle applications. A headlamp for an automobile uses multiple light sources based on electro luminescence of semiconductor junctions. The proposed unique approach is to combine the lighting engineering function i.e. the correct light distribution, color spectrum and level necessary for the visual task at hand into the lamp such that the digital lamp obviates the need for additional light controls and fixtures. The digital electronic lamp utilizes ⅓ the energy and has over 100,000 hours lifetime versus 2000 for an automotive incandescent lamp and can be rapidly switched on and off without deleteriously affecting lifetime. (Quite the opposite, off time is not part of the lifetime). The | The new Matrix Beam system combines a front camera, high-performance software and "intelligent lighting" technology to recognize cars that are being followed as well as oncoming traffic. (Ex. 10 at 1, emphasis added.)<br><br>The system automatically adjusts a car's headlamps to deliver "glare free" illumination, dimming or switching on and off light sources based on traffic conditions. *Id.*<br><br>**Individually controlled LEDs also provide two or** |

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| | multiple light-source, digital device, is an electronic headlight which provides the driver with the correct aiming, illumination level and distribution (e.g. parking lights, low beam, high beam, lighting around curves and corners) based on input from the vehicle's speed, steering wheel position, turn signal indicator and detection of approaching headlights.<br><br>**52:54 - 53:4**<br>Additional features can include an optional very narrow flashlight type of beam. Present day LEDs come in very narrow aimings such as two half angle 8 degrees which may not be narrow enough (a 10 meter spread for 150 meters down the road which may be sufficiently aimed to the right) but with need, smaller angles are also feasible. Such a beam at the correct narrow aiming can continue to illuminate far ahead (in high beam) without blinding oncoming traffic. Analysis by a detector or an imaging system of the oncoming vehicles position (using its headlights for example) can be used to determine which exact aiming is the maximum allowable for any given traffic situation and road layout.<br><br>Using color and pattern recognition techniques it is possible to determine what | **more dark zones with "light in-between," allowing continuous use of a vehicle's high-beams to maximize visibility and provide a safer driving experience.** *Id.*<br><br>"[F]rom the above sentences, it would be clear to a person skilled in the art that the industry praise description of an illuminating device with "two or more dark zones with 'light-in-between" to maximize visibility, corresponds to the above-identified claim limitation, providing reduced illumination in the dark zones relative to the illumination on both sides of the dark zone." (Ex. OTH-A at ¶107, 117.) |

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| | is a sign. It is then possible to provide the equivalent of "task lighting" and use the controller and properly aimed SLS to follow and illuminate distant overhead and roadside signs for a longer time, yet not blind oncoming traffic due to the narrow beam.<br><br>**22:14-22**<br>In a DLF it is possible to combine a task light having a very narrow "spot" beam at the correct aiming with a general area lighting "flood" beam into one fixture. The digital lighting fixture is positioned according to recommended lighting practice near a workstation and correctly oriented such that the DLF gives a wide (though still controlled, so as not to cause glare on a computer display) general illumination distribution as well as a narrow distribution aimed at the desktop for high intensity task lighting.<br><br>**45:27-44**<br>In a further ADLF intelligent lighting system improvement over prior-art practice, machine vision is used to control surrounding luminance. A prime example is an office application where a computer Visual Display Terminal is in use. This is an application where the quality of the | |

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| | localized task lighting is important. Contrast plays a major role in seeing and glare plays a role in producing veiling reflections as causing fatigue. The correct illuminating solution involves the control of surrounding luminances. A prior art workstation design will include partition, carpet, ceiling and desk surface reflectance which reduce the luminance in the workers field of view. Using the ADLFs ability to recognize the computer screen chair, desk and surrounding floor and ceiling, the illuminance in lux on each element is varied to obtain the optimal luminance. That now allows any color scheme to be used by the interior designer on the work cell decor. The ADLF will control the luminance by varying the spatial light intensity distribution over the different surfaces.<br><br>**1:25-36**<br>The present invention is in the field of radiation producing devices. More particularly, the present invention is in the technical field of lighting fixtures. However, radiation used for headlamps, heating, night vision, UV or visible light curing, medical X-rays and other radiation uses are covered as well. General lighting fixtures otherwise known as luminaires will be used as the primary example while other irradiating | |

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| | devices such as infrared heaters are covered as well. The invention relates to multiple light source illuminating devices intended to replace incandescent, fluorescent and HID luminaries in general and specialty lighting applications.<br><br>**95:3-14**<br>There has thus been shown and described, among other things, a multiple-source lighting technology which allows for the design and construction of illuminating devices. Many changes, modifications, variations and other uses and applications of the subject invention will, however, become apparent to those skilled in the art after considering this specification and the accompanying drawings which disclose the preferred embodiments thereof. All such changes, modifications, variations and other uses and applications which do not depart from the spirit and scope of the invention are deemed to be covered by the invention without departing from the spirit or scope of the following claims. | |

# Exhibit OTH-F
## Side by Side Claim Comparison

| Claim 6 | Claim 24 | Claim 32 | Claim 40 | Claim 48 | Claim 56 | Claim 64 | Claim 72 | Claim 80 |
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| *An illuminating device having automatic control of the light provided to an illuminated area comprising:* | *24. (New) An illuminating device having automatic control of light provided to an illuminated area comprising:* | *32. (New) An illuminating device having automatic control of light provided to an illuminated area comprising:* | *40. (New) An illuminating device having automatic control of light provided to an illuminated area comprising:* | *48. (New) An illuminating device having automatic control of light provided to an illuminated area comprising:* | *56. (New) An illuminating device having automatic control of light provided to an illuminated area comprising:* | *64. (New) An illuminating device having automatic control of light provided to an illuminated area comprising:* | *72. (New) An illuminating device having automatic control of the light provided to an illuminated area comprising:* | *80. (New) An illuminating device having automatic control of light provided to an illuminated area comprising:* |
| *a structure for incorporating illuminating device elements;* | *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* | *a structure for incorporating illuminating device elements, wherein the structure comprises a motor vehicle;* |
| *one or more light sources incorpo* | *a pluralit y of individu ally* | *a pluralit y of individu ally* | *a pluralit y of individu ally* | *a pluralit y of individu ally* | *a pluralit y of individu ally* | *a pluralit y of individu ally* | *a pluralit y of individu ally* | *a pluralit y of individu ally* |

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| rated in the structure and in communication with a power source; | controllable LEDs light sources 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; | 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; | 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; | 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; | 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; | 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; | 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; | 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; |
| electronic circuitry apparatus for the controlled powering of the light | electronic circuitry apparatus for the controlled powering of the light | electronic circuitry apparatus for the controlled powering of the LEDs | electronic circuitry apparatus for the controlled powering of the LEDs | electronic circuitry apparatus for the controlled powering of the LEDs | electronic circuitry apparatus for the controlled powering of the LEDs | electronic circuitry apparatus for the controlled powering of the LEDs | electronic circuitry apparatus for the controlled powering of the LEDs | electronic circuitry apparatus for the controlled powering of the LEDs |

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| source and other illumina ting device element s; | source LEDs and other of the illumina ting device element s; | and other of the illumina ting device element s; | and other of the illumina ting device element s; | and other of the illumina ting device element s; | and other of the illumina ting device element s; | and other of the illumina ting device element s; | and other element s of the illumina ting device element s; | and other of the illumina ting device element s; |
| | one or more process ors; | one or more process ors; | one or more process ors; | one or more process ors; | one or more process ors; | one or more process ors; | one or more process ors; | one or more process ors; |
| one or more cameras placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area, said camera in commun ication with power and control device | one or more sensors, includin g one or more cameras , placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area, at least one of said cameras in commun ication | one or more sensors, includin g one or more cameras , placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area and position ed to capture an image of at least | one or more sensors, includin g one or more cameras , placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area and position ed to capture an image of at least | one or more sensors, includin g one or more cameras , placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area, at least one of said cameras in commun ication | one or more sensors, includin g one or more cameras , placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area and position ed to capture an image of at least | one or more sensors, includin g one or more cameras , placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area and position ed to capture an image of another | one or more sensors, includin g one or more cameras , placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area, at least one of said cameras in commun ication | one or more sensors, includin g one or more cameras , placed on the structur e for detectin g coordin ate-specific informa tion about the illumina ted area and position ed to capture camera data indicati ng a |

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| *element s;* | *with power, and in commun ication with at least one of the one or more process ors;* | *one target, at least one of said cameras in commun ication with power, and in commun ication with at least one of the one or more process ors;* | *two other vehicles , at least one of said cameras in commun ication with power, and in commun ication with at least one of the one or more process ors;* | *with power, and in commun ication with at least one of the one or more process ors;* | *one other vehicle ahead of the motor vehicle, at least one of said cameras in commun ication with power, and in commun ication with at least one of the one or more process ors;* | *vehicle, at least one of said cameras in commun ication with power, and in commun ication with at least one of the one or more process ors;* | *with power, and in commun ication with at least one of the one or more process ors;* | *target ahead of the motor vehicle, at least one of said cameras in commun ication with power, and in commun ication with at least one of the one or more process ors;* |
| *a controll er integrat ed with the structur e, in commun ication with the light source controll ing power circuitr y, said controll* | *a controll er, includin g at least one of the one or more process ors, integrat ed with the structur e via mountin g, in commun* | *a controll er, includin g at least one of the one or more process ors, integrat ed with the structur e via mountin g, in commun* | *a controll er, includin g at least one of the one or more process ors, integrat ed with the structur e via mountin g, in commun* | *a controll er, includin g at least one of the one or more process ors, integrat ed with the structur e via mountin g, in commun* | *a controll er, includin g at least one of the one or more process ors, integrat ed with the structur e via mountin g, in commun* | *a controll er, includin g at least one of the one or more process ors, integrat ed with the structur e via mountin g, in commun* | *a controll er, includin g at least one of the one or more process ors, integrat ed with the structur e via mountin g, in commun* | *a controll er, includin g at least one of the one or more process ors, integrat ed with the structur e via mountin g, in commun* |

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| er arranged to processes [sp] the information communicated from the camera and automatically control the light provided to the illuminated area. | ication 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 | ication 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 | ication 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 | ication 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 | ication 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 | ication 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 | ication 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 | ication 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 |
| | memory storing instructions that, when executed by one or more process | memory storing instructions that, when executed by one or more process | memory storing instructions that, when executed by one or more process | memory storing instructions that, when executed by one or more process | memory storing instructions that, when executed by one or more process | memory storing instructions that, when executed by one or more process | memory storing instructions that, when executed by one or more process | memory storing instructions that, when executed by one or more process |

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| | ors of the controller, enable the controller to: | ors of the controller, enable the controller to: | ors of the controller, enable the controller to: | ors of the controller, enable the controller to: | ors of the controller, enable the controller to: | ors of the controller, enable the controller to: | ors of the controller, enable the controller to: | ors of the controller, enable the controller to: |
| | determine first coordinates corresponding to another vehicle, based on the coordinate-specific information; | create a beam of diminished illumination illuminating at least a portion of the at least one target with non-glaring illumination, created within a broader field of illumination having different intensity than the beam, by one or more changes to characteristics of first | 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; | 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, | determine, based on data from one or more of the sensors, a vertical and horizontal position associated with the at least one other vehicle; | 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; | determine a target based on first data from one or more of the sensors; | 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 |

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| | | *light of a cluster of the LEDs providing the first light directed at the at least a portion and creating the beam, the beam diminished in intensity relative to the broader field of illumination illuminating at least above and on both sides of the beam; and* | | *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;* | | | | |

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| | *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* | *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.* | *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;* | *and 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* | *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* | *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;* | *determine a first target location based on the first data;* | *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* |

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| | | | | *elevation with the first area and laterally adjacent to the first area.* | | | | *to the motor vehicle.* |
| | *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* | | *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;* | | *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* | *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* | *select a cluster of the LEDs having light associated therewith that is directed at the target, determined based on the first target location;* | |

| | | | | | | | | |
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| | *driver of the other vehicle.* | | | | *second cluster of the LEDs, by control of emission from the first cluster.* | *the other vehicle; and* | | |
| | | | *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,* | | | *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* | *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* | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | *second position .* | | |
| | | | *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.* | | | | *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 , selectio* | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | *n of the cluster and variance to illumination provided to the target, relative to the laterally adjacent areas, based on the subsequent data.* | |

# Exhibit OTH-G

## European Patent No. EP1391347 B1

## Krukenbaum et al.

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## (54) Scheinwerfer für Fahrzeuge

Headlamp for vehicle

Projecteur pour véhicule

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## Beschreibung

**[0001]** Die Erfindung betrifft einen Scheinwerfer für Fahrzeuge mit einem Gehäuse, mit einem im Inneren des Gehäuses angeordneten Abblendlicht- und einem Fernlichtmodul, mit Einstellvorrichtungen für das Abblendlichtmodul und das Fernlichtmodul, durch welche das Abblendlichtmodul zur Grundeinstellung um eine horizontale und vertikale Achse schwenkbar und das Fernlichtmodul zur Justierung um eine horizontale Achse schwenkbar ist, und mit einem zwischen Abblendlicht- und Fernlichtmodul verlaufenden Koppelelement, zwischen dem und dem Abblendlicht- und Fernlichtmodul jeweils eine gelenkartige Verbindung besteht, durch welches das Fernlichtmodul bei einem Schwenken des Abblendlichtmoduls um seine horizontale Achse um eine horizontale Achse mitschwenkt.

**[0002]** Ein solcher Scheinwerfer für Fahrzeuge ist aus der DE - U- 20202442 bekannt. Der Scheinwerfer weist ein aus Kunststoff bestehendes Gehäuse auf, dessen Vorderseite durch eine lichtdurchlässige Abschlussscheibe abgeschlossen ist. Im Inneren des Gehäuses ist ein Abblendlicht- und ein Fernlichtmodul angeordnet. Als Abblendlichtmodul dient ein Projektionsmodul und als Fernlichtmodul ein schalenförmiger Reflektor für Fernlicht. Die Vorderseiten des Abblendlicht- und Fernlichtmoduls sind in Lichtaustrittsrichtung zueinander versetzt angeordnet. Der Tragrahmen des Abblendlichtmoduls und des schalenförmigen Reflektors sind durch ein Koppelelement verbunden. Als Koppelelement dient ein Führungsstück, das mit Führungsflächen des Gehäuses zusammenwirkt und von den Führungsflächen vertikal gehaltert ist. Das Führungsstück haltert wiederum eine von einem Leuchtweiteregler gebildete Ei n-stellvorrichtung, die mit dem unteren Bereich des Tragrahmens des Abblendlichtmoduls gelenkig verbunden ist. Das Führungsstück haltert wiederum über den Leuchtweiteregler das Abblendlichtmodul. Durch den Leuchtweiteregler ist das Abblendlichtmodul um ein horizontale Achse schwenkbar. Die horizontale Achse ist definiert durch zwei zwischen dem oberen Bereich des Tragrahmens und dem Gehäuse bestehenden Schwenklager. Ein Schwenklager ist ortsfest ausgeführt, während das andere Schwenklager zu einer manuellen Einstellvorrichtung gehört. Durch diese Einstellvorrichtung ist das Abblendlichtmodul um eine vertikale Achse schwenkbar, die von der gelenkigen Verbindung zwischen dem Leuchtweiteregler und dem ortsfesten Schwenklager gebildet ist und die benachbart zu dem schalenförmigen Reflektor verläuft. Der schalenförmige Reflektor ist an seinem oberen Bereich über zwei Schwenklager mit dem Gehäuse verbunden. Die beiden Schwenklager sind jeweils mit einer manuellen Einstellvorrichtung gekoppelt und definieren eine horizontale Achse. Im unteren Bereich des schalenförmigen Reflektors ist das Führungsstück gelenkig mit dem Reflektor verbunden. Das Führungsstück ist zusammen mit dem Leuchtweiteregier durch eine manuelle Einstellvorrichtung, die eine mit dem Gehäuse verbundene Einstellschraube aufweist, in bzw. entgegen der Lichtaustrittsrichtung des Scheinwerfers verschiebbar. Dadurch ist das Abblendlichtmodul gemeinsam mit dem Fernlichtmodul um jeweils eine horizontale Achse manuell schwenkbar. Die beiden manuellen Einstellvorrichtungen des Fernlichtmoduls dienen zur Justierung des Fernlichtmoduls gegenüber dem Abblendlichtmodul. Das Führungsstück, welches das Fernlichtmodul mit dem Abblendlichtmodul koppelt, muss groß dimensioniert und in einer Führung des Gehäuses verschiebbar und gehaltert sein, da es die von dem Leuchtweiteregler gebildete Einstellvorrichtung und das Abblendlichtmodul trägt. Weiterhin kann wegen der großen Ausdehnung des Führungsstücks sich verziehen und ist dann nur noch schwergängig in der Führung des Gehäuses verschiebbar.

**[0003]** Aus der EP -A- 1 120 310 ist ein Scheinwerfer für Fahrzeuge bekanntgeworden, bei dem im Inneren des Scheinwerfers ein Abblendlichtmodul angeordnet ist, das durch eine von einem Leuchtweiteregler gebildete Einstellvorrichtung um ein horizontale Achse schwenkbar ist. Seitlich neben dem Abblendlichtmodul ist im Gehäuse eine Abstandsmesseinheit angeordnet. Die Abstandsmesseinheit ist an dem Gehäuse um zwei Schwenklager um eine horizontale Achse schwenkbar. Das Abblendlichtmodul und die Abstandsmesseinheit sind durch ein Koppelelement miteinander verbunden. Als Koppelelement dient ein Gelenkelement, das gelenkig mit dem Abblendlichtmodul und der Abstandsmesseinheit verbunden ist. Dadurch ist der Abblendlichtmodul und die Abstandsmesseinheit gemeinsam um jeweils eine horizontale Achse durch den Leuchtweiteregler schwenkbar. Das Gelenkelement besteht aus einem Gewindebolzen, der in eine an der Abstandsmesseinheit gelagerten Mutter eingreift und mit einem Kugelkopf gelenkig an dem Abblendlichtmodul gelagert ist. Dadurch ist die Abstandsmesseinheit gegenüber dem Abblendlicht justierbar. Nachteilig hierbei ist, dass die Justiervorrichtung aus vielen Einzelteilen besteht und nur durch umständlich durch eine durch einen Deckel verschließbare Gehäuseöffnung hindurch zugänglich ist. Ferner kann sich beim gemeinsamen Verstellen von Abblendlichtmodul und Abstandsmesseinheit die Justiervorrichtung mit bewegen und sich somit selbsttätig verstellen.

**[0004]** Aufgabe der Erfindung ist es, den im Oberbegriff des Anspruch 1 beschriebenen Scheinwerfer für Fahrzeuge derart zu verbessern, dass alle Einstellungen von dem Abblendlicht- und Fernlichtmodul des Koppelelements funktionssicher durchführbar sind. Diese Aufgabe wird nach der Erfindung dadurch gelöst, dass alle Einstellvorrichtungen für das Abblendlicht- und das Fernlichtmodul zwischen denselben und dem Gehäuse des Scheinwerfers bestehen und das Koppelelement ein Gelenkelement einer Gelenkvorrichtung ist und ausschließlich an gelenkartigen Verbindungen des Abblendlicht- und Fernlichtmoduls gehalten ist. Dadurch ist



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ein einfacher Aufbau des Koppelelements möglich und die zur Justierung des Fernlichtmoduls dienende Einstellvorrichtung, durch die das Fernlichtmodul um eine horizontale Achse schwenkbar ist, kann so ausgeführt sein, dass sie von der Außenseite des Gehäuse her einfach und leicht zugänglich ist. Weiterhin können der Leuchtweiteregler und die zur Justierung des Fernlichtmoduls dienende Einstellvorrichtung ohne Rücksicht auf das Koppelelement und das Koppelelement ohne Rücksicht auf den Leuchtweiteregler und die zur Justierung des Fernlichtmoduls dienende Einstellvorrichtung dimensioniert und gestaltet sein.

**[0005]** Das Koppelelement ist kostengünstig herstellbar, wenn es stangenförmig ausgeführt und ein einstükkiges Bauteil ist.

**[0006]** Weiterhin ist es vorteilhaft, wenn das Koppelelement, bei in Lichtaustrittsrichtung versetzt zueinander angeordneten Vorderseiten des Abblendlicht- und Fernlichtmoduls, mindestens in einem Abschnitt zwischen den Vorderseiten verläuft, und die gelenkartigen Verbindungen der Gelenkvorrichtung an den sich benachbarten Randbereichen des Abblendlicht- und Fernlichtmoduls angeordnet sind. Dadurch baut das Koppelelement möglichst kurz und eine Dejustierung des Fernlichtmoduls durch eine Ausdehnung des Koppelelements infolge einer großen Temperaturerhöhung im Scheinwerferinneren ist sehr klein und somit nicht mehr störend. In diesem Zusammenhang ist es weiterhin vorteilhaft, wenn es entlang einer in Lichtaustrittsrichtung verlaufenden Vertikalebene verläuft und die gelenkartigen Verbindungen am vorderen und hinteren Endabschnitt des Koppelelements angeordnet sind. Dadurch ist an den gelenkartigen Verbindungen des Koppelelements beim gemeinsamen Verstellen von Abblendlichtmodul und Fernlichtmodul kein Verklemmen und Verkanten des Koppelelements möglich.

**[0007]** Ein weiterer Vorteil besteht, wenn eine gelenkartige Verbindung benachbart zu einem Gelenkpunkt der Einstellvorrichtung, durch die das Abblendlichtmodul um die horizontale Achse schwenkbar ist, an dem Abblendlichtmodul angeordnet ist. Durch diese Mittel ist auch bei einem leicht bauenden Abblendlichtmodul eine stabile Verbindung zwischen dem Abblendlichtmodul und dem Koppelelement gegeben. Je näher die gelenkartige Verbindung zu dem Gelenkpunkt angeordnet ist, um so leichtgängiger ist das Abblendlichtmodul um die durch den Gelenkpunkt hindurchgehende Achse schwenkbar. Besonders vorteilhaft ist es, wenn der die gelenkartige Verbindung von dem letzteren Gelenkpunkt gebildet ist.

**[0008]** Die Gelenkvorrichtung ist kostengünstig herstellbar und das Koppelelement ist einfach und schnell montierbar, wenn die gelenkartigen Verbindungen von einem Lagerzapfen und einer Lageröffnung gebildet sind, deren Schwenkachse quer zur Lichtaustrittrichtung des Scheinwerfers verläuft, und die Lagerzapfen und Lageröffnungen von einstückig mit Bauteilen des Abblendlichtmoduls bzw. Fernlichtmoduls ausgeführten Gelenkteilen gebildet sind.

**[0009]** Weiterhin ist es zweckmäßig, wenn die vertikale Achse für das Abblendlichtmodul durch Gelenkpunkte definiert ist, die am Abblendlichtmodul benachbart zum Fernlichtmodul angeordnet sind und zwischen dem Abblendlichtmodul und dem Gehäuse bestehen. Dadurch ist die Seite des Abblendlichtmoduls, die über das Koppelelement das Fernlichtmodul haltert, sicher gegen die im Fahrbetrieb auftretenden Vibrationen gehalten.

**[0010]** Bei einer besonders vorteilhaften Weiterbildung der Erfindung weist die dem Abblendlichtmodul zugeordnete Einstellvorrichtung, durch die das Abblendlichtmodul und das Fernlichtmodul gemeinsam um horizontale Achsen schwenkbar sind, eine Verstelleinrichtung zur Grundeinstellung des Abblendlicht- und Fernlichtmoduls und einen automatischen Leuchtweiteregler auf. Dadurch ist die Leuchtweite des Abblendlichtmoduls und des Fernlichtmoduls gemeinsam sowohl zur Grundeinstellung als auch durch den automatischen Leuchtweiteregler verstellbar. Die Verstelleinrichtung zur Grundeinstellung kann manuell oder automatisch durch den Leuchtweiteregler erfolgen.

**[0011]** Weiterhin ist es vorteilhaft, wenn das Fernlichtmodul ein schalenförmiger Reflektor und das Abblendlichtmodul ein Schwenkmodul für Kurvenlicht ist, wobei eine gelenkartige Verbindung des Koppelelements von einem das Kurvenlichtmodul umgebenden Rahmen gebildet ist. Da wegen der großen Masse eines Kurvenlichtmoduls sein zur Halterung dienender Rahmen stabil ausgeführt ist, ist auch das vergleichsweise leichte Fernlichtmodul über das Koppelelement sicher gegen Vibrationen gehalten.

**[0012]** Zwei Ausführungsbeispiele nach der Erfindung sind in der Zeichnung dargestellt und zwar zeigen

**[0013]** Figur 1 in einer perspektivischen Ansicht einen ersten Scheinwerfer für Fahrzeuge, bei dem ein Abblendlicht- und ein Fernlichtmodul gemeinsam durch Einstellvorrichtungen sowohl manuell als auch automatisch um horizontale Achsen schwenkbar sind, und

**[0014]** Figur 2 in einer perspektivischen Ansicht einen zweiten Scheinwerfer für Fahrzeuge, bei dem ein Abblendlicht- und ein Fernlichtmodul gemeinsam durch eine Einstellvorrichtung manuell um horizontale Achsen schwenkbar sind und ausschließlich das Abblendlichtmodul durch einen Leuchtweiteregler automatisch um eine horizontale Achse schwenkbar ist.

**[0015]** Der erste Scheinwerfer (Figur 1) für Fahrzeuge weist ein Abblendlichtmodul 1 und ein Fernlichtmodul 2 auf, welche in einem nicht dargestellten Gehäuse angeordnet sind. Die Vorderseiten 18 und 19 des Abblendlicht- und Fernlichtmoduls 1 und 2 sind in Lichtaustrittsrichtung versetzt zueinander angeordnet. Von dem Abblendlichtmodul 1 ist nur ein äußerer Rahmen 16 dargestellt. In den Rahmen 16 des Abblendlichtmoduls 1 ist ein nicht dargestelltes Schwenkmodul eingesetzt, welches für Kurvenlicht um eine vertikale Achse schwenkbar ist. Der Rahmen 16 ist über drei Gelenkpunkte 17, 20 und 21 mit dem Gehäuse verbunden. Die beiden Gelenkpunkte 17 und 21 sind in den Eckbereichen des dem



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Fernlichtmodul 2 nahen Randbereich des Rahmens 16 angeordnet und definieren eine vertikale Achse 8. Um die vertikale Achse 8 ist das Abblendlichtmodul 1 bzw. der Rahmen 16 durch eine dem Gelenkpunkt 20 zugeordnete manuelle Einstellvorrichtung 3 zur Grundeinstellung schwenkbar. Die Einstellvorrichtung 3 ist an dem Gehäuse gehaltert und weist eine Getriebeanordnung 22 auf, durch die eine Verstellung des Abblendlichtmoduls 1 von der oberen Seite des Gehäuses her möglich ist. Der Gelenkpunkt 20 ist an einem äußeren unteren Eckbereich des Rahmens 16 und der Gelenkpunkt 21 am inneren unteren Eckbereich des Rahmens 16 angeordnet. Die beiden Gelenkpunkte 20 und 21 definieren eine horizontale Achse 7 um die das Abblendlichtmodul 1 durch eine dem oberen Gelenkpunkt 17 zugeordnete Einstellvorrichtung 4/5 schwenkbar ist. Die Einstellvorrichtung 4/5 setzt sich zusammen aus einer von einer manuellen Verstellvorrichtung gebildeten Einstellvorrichtung 4 und einer von einem automatischen Leuchtweiteregler gebildeten Einstellvorrichtung 5. Die Einstellvorrichtung 5 ist am Gehäuse gehaltert, während die Einstellvorrichtung 4 zwischen der Einstellvorrichtung 5 und dem Gelenkpunkt 17 angeordnet ist. Das Fernlichtmodul 2 ist gegenüber dem Abblendlichtmodul 1 nach vorne hin versetzt angeordnet. Als Fernlichtmodul 2 dient ein aus Kunststoff bestehender schalenförmiger Reflektor. An den unteren Randbereich des Fernlichtmoduls 2 sind zwei Gelenkpunkte 23 angebracht, die eine horizontale Achse 13 definieren und denen eine Einstellvorrichtung 6 zugeordnet ist. Die Einstellvorrichtung 6 besteht aus zwei an dem Gehäuse gehalterten Einstellschrauben. Das Fernlichtmodul 2 ist mit dem Abblendlichtmodul 1 durch ein Koppelelement 10 verbunden. Das Koppelelement 10 ist einstückig aus Kunststoff herstellt und stangenförmig ausgeführt. Zwischen den freien Endabschnitten des Koppelelements 10 und dem Abblendlicht- und Fernlichtmodul 1 und 2 besteht jeweils eine gelenkartig Verbindung 11 bzw. 12. Die gelenkartige Verbindung 11 ist nahe dem Gelenkpunkt 17 und die gelenkartig Verbindung 12 in dem dem Rahmen 16 benachbarten oberen Randbereich des Fernlichtlichtmoduls 2 angeordnet. Die gelenkartigen Verbindung 11 und 12 bestehen aus einem Lagerzapfen und einer Lageröffnung (nicht dargestellt). Der Lagerzapfen weist eine ballige Mantelfläche auf, ist in seiner Längsausdehnung geschlitzt und weist an seine beiden freien Endabschnitten jeweils eine Rastnase auf, die die Lageröffnung selbsttätig hintergreift. Die Lageröffnungen sind in eine äußere Wand des Rahmens 16 eingebracht. Bei einem manuellen oder automatischen Schenken des Abblendlichtmoduls 1 durch die Einstellvorrichtung 4/5 um die horizontale Achse 7 schwenkt das Fernlichtmodul 2 wegen dem Koppelelement 10 um die horizontale Achse 13. Die beiden an dem Gehäuse gehalterten Einstellschrauben der Einstellvorrichtung 6 sind von der Außenseite des Gehäuses her einfach und leicht zugänglich und schwenken das Fernlichtmodul bei gleichzeitiger Betätigung um die horizontale Achse 9, die durch die gelenkartige Verbindung 12 definiert ist. Dadurch ist das Fernlichtmodul 2 gegenüber dem Abblendlichtmodul 1 justierbar. Beim Verstellen der äußeren Einstellschraube der Einstellvorrichtung 6 ist schwenkt das Fernlichtmodul 2 um eine vertikale Achse 24, die durch den inneren Gelenkpunkt 23 und die gelenkartige Verbindung 12 hindurchgeht. Die äußere Einstellschraube der Einstellvorrichtung 6 dient somit der Grundeinstellung des Fernlichtmoduls 2. Der Abstand der gelenkartigen Verbindung 11 zur horizontalen Achse 7 des Abblendlichtmoduls 1 und der Abstand der gelenkartige Verbindung 12 zur horizontalen Achse des 13 des Fernlichtmoduls 2 sind gleich groß.

**[0016]** Der zweite Scheinwerfer (Figur 2) unterscheidet sich gegenüber dem ersten Scheinwerfer (Figur 1) durch nachstehend beschriebene Merkmale. Der automatische Leuchtweiteregler der Einstellvorrichtung 5 ist dem unteren Gelenkpunkt 21 zugeordnet und der Gelenkpunkt 20 ist in dem äußeren oberen Eckbereich des Rahmens 16 angeordnet. Dadurch schwenkt der Leuchtweiteregler der Einstellvorrichtung 5 ausschließlich das Abblendlichtmodul 1 um eine horizontale Achse 25, die durch die oberen Gelenkpunkte 17 und 20 hindurchgeht. Beim manuellen Einstellen des Abblendlichtmoduls 1 durch die Einstellvorrichtung 4 schenkt dieser um die horizontale Achse 7, die nur durch den unteren Gelenkpunkt 21 hindurchgeht. Die Einstellvorrichtung 4 ist mit jeweils einer Einstellschraube den Gelenkpunkten 17 und 20 zugeordnet.

Bezugszeichenliste:

**[0017]**

1. Abblendlichtmodul
2. Fernlichtmodul
3. Einstellvorrichtung
4. Einstellvorrichtung
5. Einstellvorrichtung
6. Einstellvorrichtung
7. horizontale Achse
8. vertikale Achse
9. horizontale Achse
10. Koppelelement
11. gelenkartige Verbindung
12. gelenkartige Verbindung
13. horizontale Achse
14. Gelenkvorrichtung
15. Bauteil
16. Rahmen
17. Gelenkpunkt
18. Vorderseite
19. Vorderseite
20. Gelenkpunkt
21. Gelenkpunkt
22. Getriebeanordnung
23. Gelenkpunkt
24. vertikale Achse
25. horizontale Achse



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**Patentansprüche**

1. Scheinwerfer für Fahrzeuge mit einem Gehäuse, mit einem im Inneren des Gehäuses angeordneten Abblendlicht- und einem Fernlichtmodul (1 und 2), mit Einstellvorrichtungen (3, 4 und 5) für das Abblendlicht- und Fernlichtmodul (1 und 2), durch welche das Abblendlichtmodul (1) zur Grundeinstellung um eine horizontale und vertikale Achse (7 und 8) schwenkbar ist, und mit einer Einstellvorrichtung (6), durch welche das Fernlichtmodul (2) zur Justierung um eine horizontale Achse (9) schwenkbar ist und welche zwischen dem Fernlichtmodul (2) und dem Gehäuse des Scheinwerfers besteht, und mit einem zwischen Abblendlicht- und Fernlichtmodul (1 und 2) verlaufenden Koppelelement (10), zwischen dem und dem Abblendlicht- und Femlichtmodul (1 und 2) jeweils eine gelenkartige Verbindung (11 und 12) besteht, durch welches das Fernlichtmodul (2) bei einem Schwenken des Abblendlichtmoduls um seine horizontale Achse (7) um eine horizontale Achse (13) mitschwenkt, **dadurch gekennzeichnet, dass** sowohl die Einstellvorrichtungen (3, 4 und 5) für das Abblendlichtmodul (1), durch welche das Abblendlichtmodul (1) zur Grundeinstellung um eine horizontale und vertikale Achse (7 und 8) schwenkbar ist, als auch die Einstellvorrichtung (6) für das Fernlichtmodul (2), durch welche das Fernlichtmodul (2) zur Justierung um eine horizontale Achse (9) schwenkbar ist, zwischen dem Abblendlicht- bzw. Fernlichtmodul (1 bzw. 2) und dem Gehäuse des Scheinwerfers bestehen und das Koppelelement (10) ein Gelenkelement einer Gelenkvorrichtung (14) ist und ausschließlich an den gelenkartigen Verbindungen (11 und 12) des Abblendlicht- und Fernlichtmoduls (1 und 2) gehalten ist.

2. Scheinwerfer nach Anspruch 1, **dadurch gekennzeichnet, dass** das Koppelelement der Gelenkvorrichtung (14) stangenförmig ausgeführt und ein einstückiges Bauteil ist.

3. Scheinwerfer nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** das Koppelelement (10), bei in Lichtaustrittsrichtung versetzt zueinander angeordneten Vorderseiten (18 und 19) des Abblendlicht- und Fernlichtmoduls (1 und 2), mindestens mit einem Abschnitt zwischen den Vorderseiten (18 und 19) verläuft.

4. Scheinwerfer nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** das stangenartige Koppelelement (10) entlang einer in Lichtaustrittsrichtung verlaufenden Vertikalebene verläuft und die gelenkartigen Verbindungen (11 und 12) am vorderen und hinteren Endabschnitt des Koppelelements (10) angeordnet sind.

5. Scheinwerfer nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** eine gelenkartige Verbindung (11) benachbart zu einem Gelenkpunkt (17) der Einstellvorrichtung (4), durch die das Abblendlichtmodul (1) um die horizontale Achse (7) schwenkbar ist, an dem Abblendlichtmodul (1) angeordnet ist.

6. Scheinwerfer nach Anspruch 5, **dadurch gekennzeichnet, dass** eine Schwenkachse der gelenkartigen Verbindung (11) durch den Gelenkpunkt (17) hindurchgeht.

7. Scheinwerfer nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** der die gelenkartige Verbindung (11) von dem Gelenkpunkt (17) gebildet ist.

8. Scheinwerfer nach einem der Ansprüche 1 bis 7, **dadurch gekennzeichnet, dass** die gelenkartigen Verbindungen (11 und 12) von einem Lagerzapfen und einer Lageröffnung gebildet sind, deren Schwenkachse quer zur Lichtaustrittrichtung des Scheinwerfers verläuft.

9. Scheinwerfer nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** die Lagerzapfen und Lageröffnungen von einstückig mit Bauteilen (15) des Abblendlichtmoduls (1) bzw. Fernlichtmoduls (2) ausgeführten Gelenkteilen gebildet sind.

10. Scheinwerfer nach einem der Ansprüche 1 bis 9, **dadurch gekennzeichnet, dass** die vertikale Achse (8) für das Abblendlichtmodul (1) durch Gelenkpunkte (16) definiert ist, die am Abblendlichtmodul (1) benachbart zum Fernlichtmodul (2) angeordnet sind und zwischen dem Abblendlichtmodul (1) und dem Gehäuse bestehen.

11. Scheinwerfer nach einem der Ansprüche 1 bis 10, **dadurch gekenn-zeichnet, dass** die dem Abblendlichtmodul (1) zugeordnete Einstellvorrichtung (4/5), durch die das Abblendlichtmodul (1) und das Femlichtmodul (2) um horizontale Achsen (7 und 13) und gemeinsam schwenkbar sind, eine Verstelleinrichtung (4) zur Grundeinstellung des Abblendlicht- und Fernlichtmoduls (1 und 2) aufweist.

12. Scheinwerfer nach Anspruch 11, **dadurch gekennzeichnet, dass** die dem Abblendlichtmodul (1) zugeordnete Einstellvorrichtung (4/5), durch die das Abblendlicht- und Femlichtmodul (1 und 2) um horizontale Achsen (7 und 13) schwenkbar sind, einen automatischen Leuchtweiteregler (5) aufweist.

13. Scheinwerfer nach einem der Ansprüche 1 bis 12, **dadurch gekennzeichnet, dass** das Fernlichtmodul (2) ein schalenförmiger Reflektor und das Abblendlichtmodul (1) ein Schwenkmodul für Kurven-



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licht ist, wobei eine gelenkartige Verbindung (11) des Koppelelements (10) an einem das Kurvenlichtmodul umgebenden Rahmen (16) angeordnet ist.

**14.** Scheinwerfer nach einem der Ansprüche 1 bis 13, **dadurch gekenn-zeichnet, dass** die Einstellvorrichtung (6) für das Fernlichtmodul (2) von der Außenseite des Gehäuses her zugänglich ist.

## Claims

**1.** Headlamp for vehicles with a housing, a low beam module and a high beam module (1 and 2) located inside the housing, with adjustment devices (3, 4 and 5, 6) for adjusting the low beam module and the high beam module (1 and 2) such that the low beam module (1) is made to turn around a horizontal and a vertical axis (7 and 8) to attain its neutral position, and with an adjustment device (6) which makes the high beam module (2) turn around a horizontal axis (9) for adjustment which is between the high beam module (2) and the housing of the headlamp, and with a coupling element (10) between the low beam module and the high beam module (1 and 2) which is connected to both the low beam module and the high beam module (1 and 2) by an articulated link (11 and 12) which makes the high beam module (2) turn around a horizontal axis (13) when the low beam module turns around its horizontal axis (7), **characterized in that** both the adjustment devices (3, 4 and 5) for the low beam module (1) which allow the low beam module (1) to be turned around a horizontal and vertical axis (7 and 8) to attain its neutral position, and the adjustment device (6) for the high beam module (2) which allows the high beam module (2) to be turned around a horizontal axis (9) for adjustment connect the low beam module (1) on the one hand and the high beam module (2) on the other with the housing of the headlamp and that the coupling element (10) is an articulated link of a linkage mechanism (14) which is only held by the articulated links (11 and 12) of the low beam module (1) and the high beam module (2).

**2.** Headlamp of claim 1, **characterized in that** the coupling element of the linkage mechanism (14) is a single-part component made in the shape of a rod.

**3.** Headlamp of claim 1 or 2, **characterized in that** at least one section of the coupling element (10) is located between the front sides (18 and 19) of the low beam module (1) and the high beam module (2) when these front sides (18 and 19) are at an offset in the direction of light exit.

**4.** Headlamp as in one of claims 1 to 3, **characterized in that** the rod-like coupling element (10) cuts vertically across the axis of the direction of light exit and that the articulated links (11 and 12) are located at the front and rear terminal sections of the coupling element (10).

**5.** Headlamp of claims 1 to 4, **characterized in that** an articulated link (11) is attached to the low beam module (1) adjacent to a junction point (17) of the adjustment mechanism (4) which allows the low beam module (1) to be turned around the horizontal axis (7).

**6.** Headlamp of claim 5, **characterized in that** a rotation axis of the articulated link (11) cuts through the junction point (17).

**7.** Headlamp of claim 5 or claim 6, **characterized in that** the articulated link (11) is provided by the junction point (17).

**8.** Headlamp of claims 1 to 7, **characterized in that** the articulated joints (11 and 12) are made up of a journal and bearing cup each whose axis of rotation is diagonally across the direction of the headlamp light.

**9.** Headlamp of claims 1 to 8, **characterized in that** the journals and bearing cups are made up of link parts which are made up of single-part components (15) of the low beam module (1) or the high beam module (2).

**10.** Headlamp of claims 1 to 9, **characterized in that** the vertical axis (8) of the low beam module (1) is defined by junction points (16) attached to the low beam module (1) adjacent to the high beam module (2) and located between the low beam module (1) and the housing.

**11.** Headlamp of claims 1 to 10, **characterized in that** the adjustment mechanism (4/5) allocated to the low beam module (1) which allows the low beam module (1) and the high beam module (2) to be turned together around horizontal axes (7 and 13) features an adjustment mechanism (4) for resetting the low beam module (1) and the high beam module (2) to their normal positions.

**12.** Headlamp of claim 11, **characterized in that** the adjustment mechanisms (4/5) allocated to the low beam module (1) which allow the low beam module (1) and the high beam module (2) to be turned around horizontal axes (7 and 13) features an automatic headlamp leveling system (5).

**13.** Headlamp of claims 1 to 12, **characterized in that** the high beam module (2) is a dish-shaped reflector and the low beam module (1) is a projector gr for



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bend lighting where an articulated link (11) of the coupling element (10) is connected to a frame (16) around the bend lighting module.

14. Headlamp of claims 1 to 13, **characterized in that** the adjustment mechanism (6) for the high beam module (2) can be accessed from the outside of the housing.

**Revendications**

1. Projecteur pour véhicules, comprenant un boîtier, avec un module de feu de croisement (1) et un module de feu de route (2) disposés à l'intérieur du boîtier, avec des dispositifs de réglage (3, 4 et 5) du module de feu de croisement (1) et du module de feu de route (2) qui permettent de faire pivoter le module de feu de croisement (1) autour d'un axe horizontal (7) et vertical (8) pour le réglage de base, et avec un dispositif de réglage (6) qui permet de faire pivoter le module de feu de route (2) autour d'un axe horizontal (9) pour l'alignement et qui est disposé entre le module de feu de route (2) et le boîtier du projecteur, et avec un élément d'accouplement (10), qui s'étend entre le module de feu de croisement (1) et le module de feu de route (2) et entre lequel et les modules de feu de croisement et de feu de route (1 et 2) se trouve respectivement une liaison articulée (11 et 12), qui entraîne le module de feu de route (2) en rotation autour d'un axe horizontal (13) lorsque le module de feu de croisement pivote autour de son axe horizontal (7), **caractérisé en ce que** les dispositifs de réglage (3, 4 et 5) du module de feu de croisement (1), qui permettent de faire pivoter le module de feu de croisement (1) autour d'un axe horizontal (7) et vertical (8) pour le réglage de base, de même que le dispositif de réglage (6) du module de feu de route (2), qui permet de faire pivoter le module de feu de route (2) autour d'un axe horizontal (9) pour l'alignement, se trouvent entre le module de feu de croisement (1) ou le module de feu de route (2) et le boîtier du projecteur et **en ce que** l'élément d'accouplement (10) est un élément d'articulation d'un système articulé (14) et est fixé exclusivement sur les liaisons articulées (11 et 12) du module de feu de croisement (1) et du module de feu de route (2).

2. Projecteur selon la revendication 1, **caractérisé en ce que** l'élément d'accouplement du système articulé (14) est réalisé en forme de tige et constitue un composant d'une seule pièce.

3. Projecteur selon la revendication 1 ou la revendication 2, **caractérisé en ce que**, lorsque les faces avant (18 et 19) du module de feu de croisement (1) et du module de feu de route (2) sont disposées de manière décalée l'une par rapport à l'autre dans le sens de sortie de la lumière, une section au moins de l'élément d'accouplement (10) s'étend entre les faces avant (18 et 19).

4. Projecteur selon l'une des revendications 1 à 3, **caractérisé en ce que** l'élément d'accouplement en forme de tige (10) s'étend dans un plan vertical qui s'étend dans le sens de sortie de la lumière et **en ce que** les liaisons articulées (11 et 12) sont disposées dans la partie d'extrémité avant et arrière de l'élément d'accouplement (10).

5. Projecteur selon l'une des revendications 1 à 4, **caractérisé en ce qu'**une liaison articulée (11) est disposée sur le module de feu de croisement (1) au voisinage d'un point d'articulation (17) du dispositif de réglage (4) qui permet de faire pivoter le module de feu de croisement (1) autour de l'axe horizontal (7).

6. Projecteur selon la revendication 5, **caractérisé en ce qu'**un axe de pivotement de la liaison articulée (11) passe par le point d'articulation (17).

7. Projecteur selon la revendication 5 ou la revendication 6, **caractérisé en ce que** la liaison articulée (11) est formée par le point d'articulation (17).

8. Projecteur selon l'une des revendications 1 à 7, **caractérisé en ce que** les liaisons articulées (11 et 12) sont formées par un tourillon et par une ouverture d'appui dont l'axe de pivotement est perpendiculaire au sens de sortie de la lumière du projecteur.

9. Projecteur selon l'une des revendications 1 à 8, **caractérisé en ce que** les tourillons et les ouvertures d'appui sont formées par des pièces d'articulation réalisées d'un seul tenant avec des composants (15) du module de feu de croisement (1) ou du module de feu de route (2).

10. Projecteur selon l'une des revendications 1 à 9, **caractérisé en ce que** l'axe vertical (8) du module de feu de croisement (1) est défini par des points d'articulation (16) qui sont disposés sur le module de feu de croisement (1) au voisinage du module de feu de route (2) et qui se trouvent entre le module de feu de croisement (1) et le boîtier.

11. Projecteur selon l'une des revendications 1 à 10, **caractérisé en ce que** le dispositif de réglage (4/5) associé au module de feu de croisement (1), permettant de faire pivoter le module de feu de croisement (1) et le module de feu de route (2) autour d'axes horizontaux (7 et 13) et ensemble, présente un système ajustable (4) pour le réglage de base du module de feu de croisement (1) et du module de



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feu de route (2).

**12.** Projecteur selon la revendication 11, **caractérisé en ce que** le dispositif de réglage (4/5) associé au module de feu de croisement (1), permettant de faire pivoter le module de feu de croisement (1) et le module de feu de route (2) autour d'axes horizontaux (7 et 13), présente un régulateur automatique de la portée d'éclairage (5).

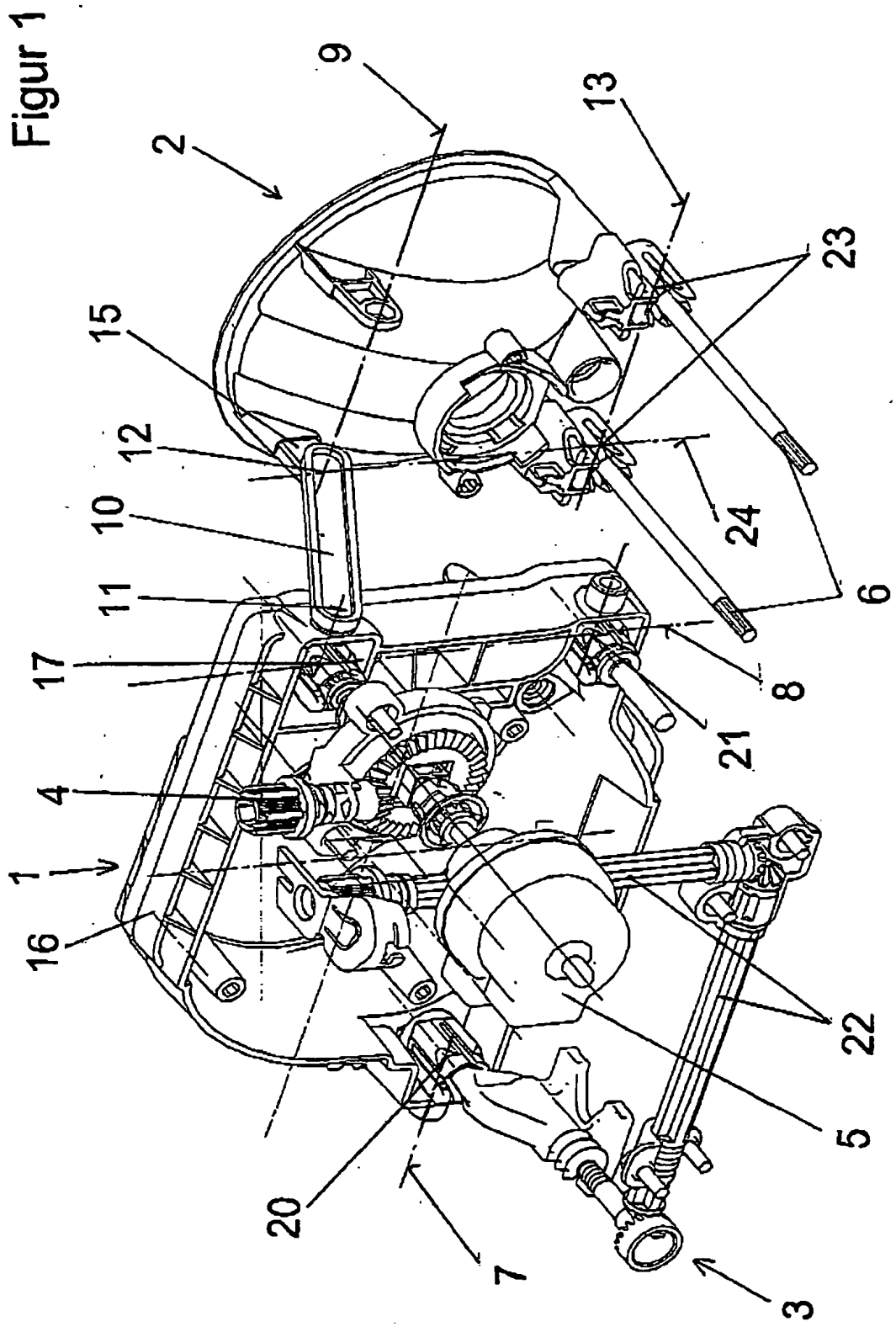
**13.** Projecteur selon l'une des revendications 1 à 12, **caractérisé en ce que** le module de feu de route (2) est un réflecteur en forme de bol et le module de feu de croisement (1) est un module pivotant pour l'éclairage dans les virages, une liaison articulée (11) de l'élément d'accouplement (10) étant disposée sur un cadre (16) entourant le module d'éclairage dans les virages.

**14.** Projecteur selon l'une des revendications 1 à 13, **caractérisé en ce que** le dispositif de réglage (6) du module de feu de route (2) est accessible de l'extérieur du boîtier.



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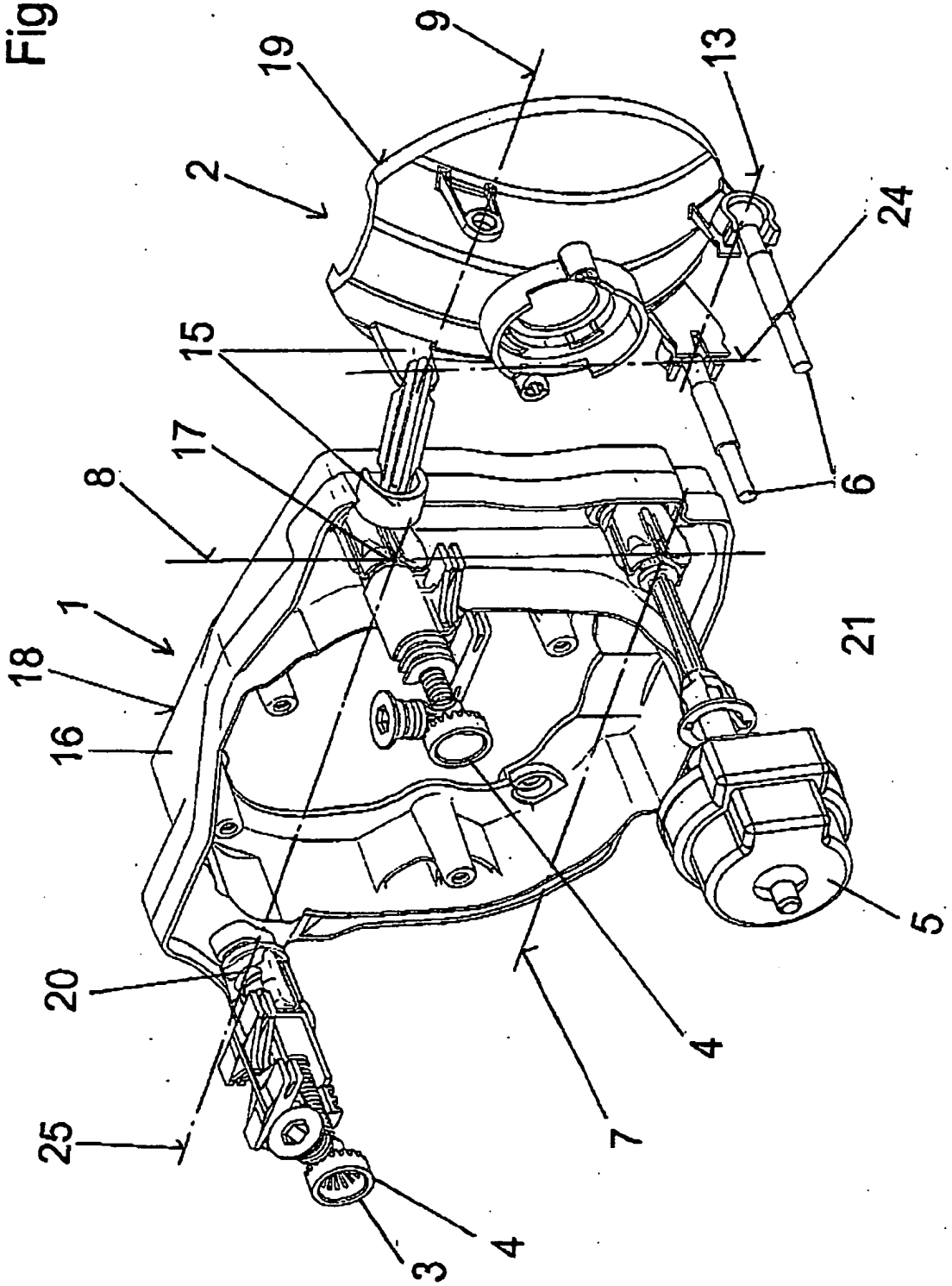
Figur 1






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Figur 2






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## IN DER BESCHREIBUNG AUFGEFÜHRTE DOKUMENTE

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

# Exhibit OTH-H

## U.S. Patent No. 6,752,523 B2

## Takahashi

US006752523B2

(12) **United States Patent**
**Takahashi**

(10) **Patent No.: US 6,752,523 B2**
(45) **Date of Patent: Jun. 22, 2004**

(54) **VEHICLE LAMP**

(75) Inventor: **Daisuke Takahashi**, Shimizu (JP)

(73) Assignee: **Koito Manufacturing Co., Ltd.**, Tokyo (JP)

( * ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 57 days.

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(30) **Foreign Application Priority Data**

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(51) **Int. Cl.**[7] ..... **F21V 13/04**

(52) **U.S. Cl.** ..... **362/545**; 362/522; 362/245; 362/800

(58) **Field of Search** ..... 362/545, 522, 362/245, 328, 240, 800, 309, 308, 307, 300, 520, 544, 543, 236

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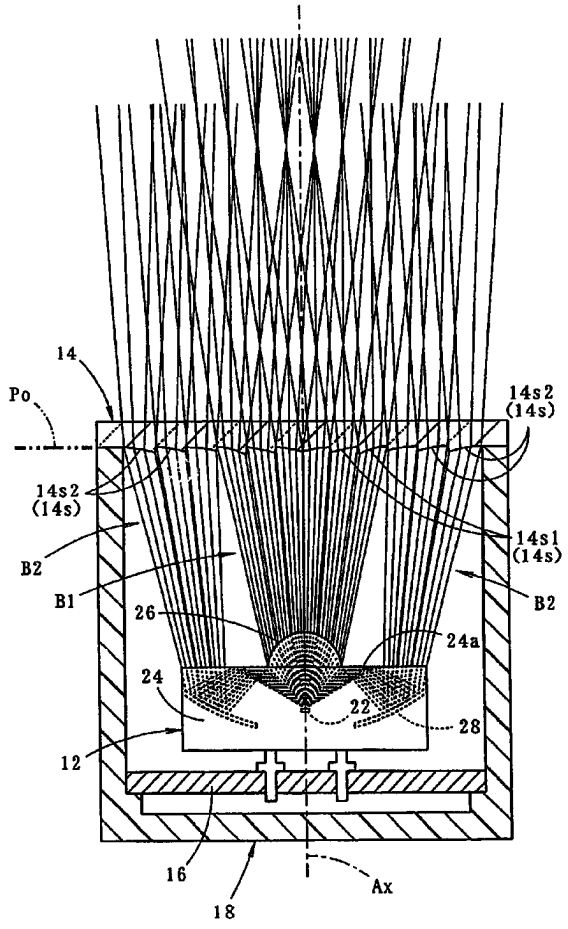
* cited by examiner

*Primary Examiner*—Sandra O'Shea
*Assistant Examiner*—B Q T
(74) *Attorney, Agent, or Firm*—Koda & Androlia

(57) **ABSTRACT**

A vehicle lamp that uses a special LED made of: translucent block body, an LED chip embedded in the translucent block body, a semi-spherical shape condenser lens provided on the front end surface of the translucent block body and positioned in front of the LED chip, and a reflector provided inside the translucent block body and forwardly reflects the light from the LED chip. The vehicle lamp includes a front lens disposed in front of the special LED so that the front lens is positioned where the direct light from the LED chip and the reflection light reflected by the reflector start to intersect with each other.

**9 Claims, 8 Drawing Sheets**



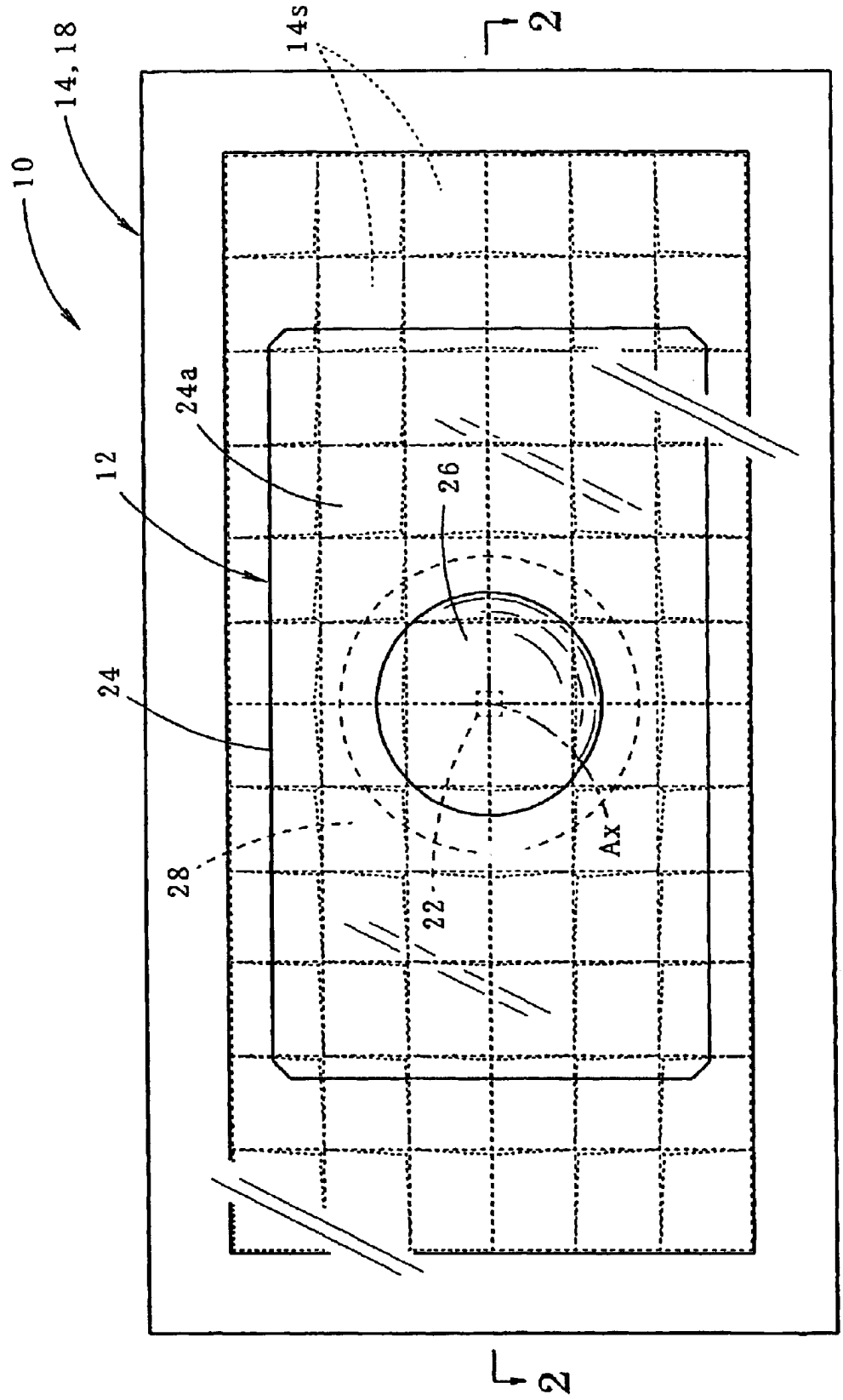



FIG. 1

FIG. 2

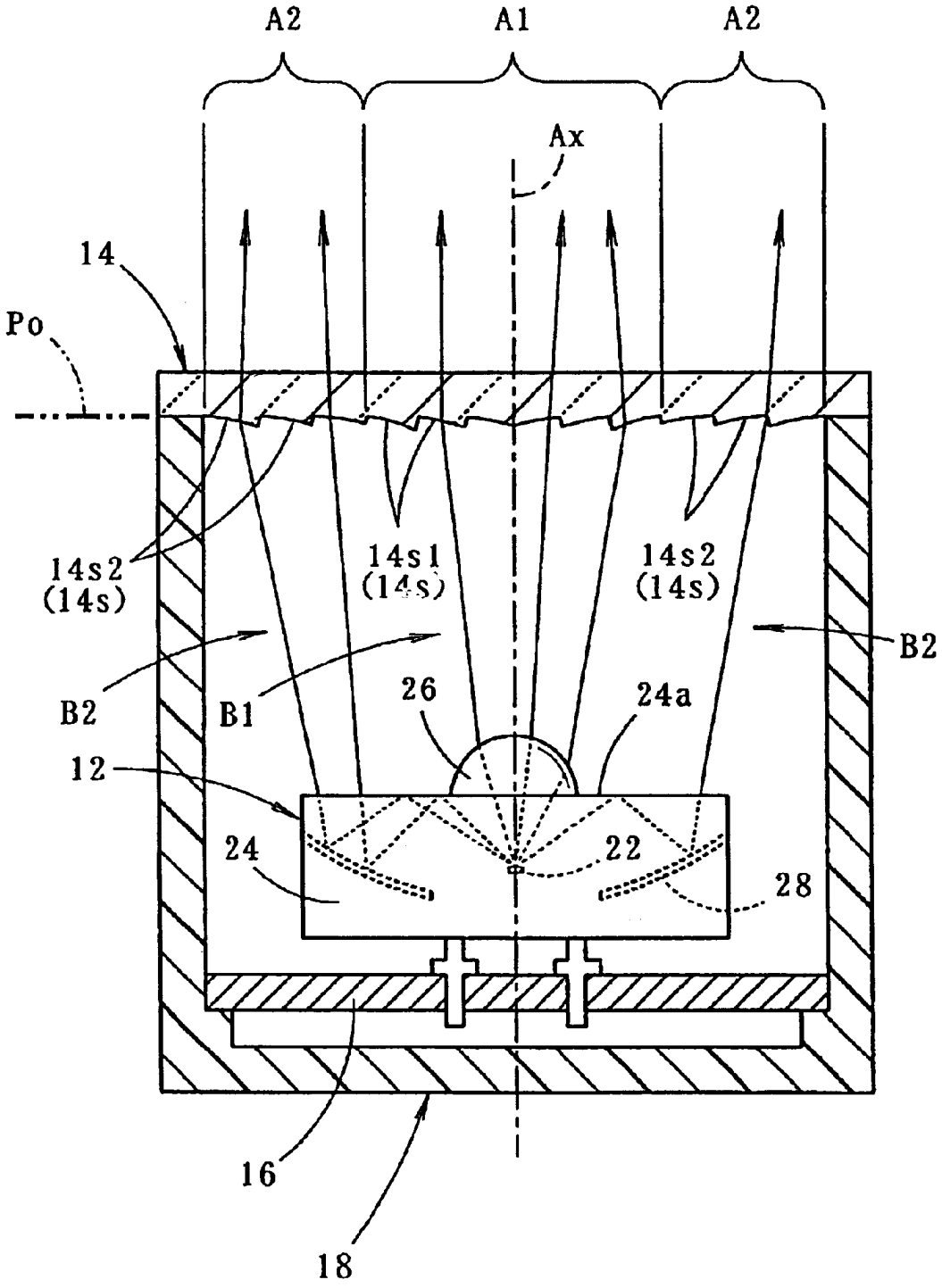
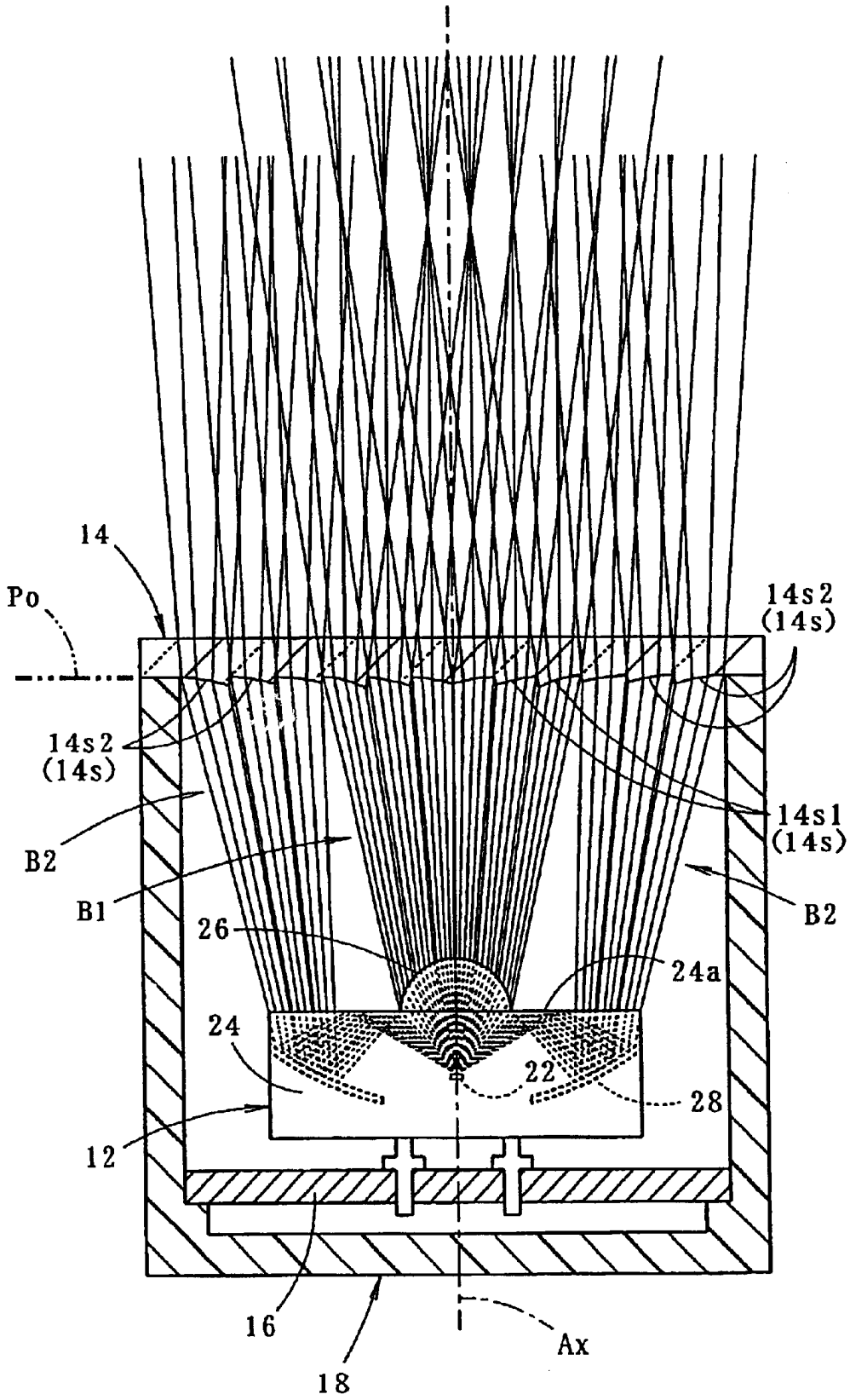

A2
A1
A2
Ax
14
Po
14s2
(14s)
14s1
(14s)
14s2
(14s)
B2
B1
B2
26
24a
12
24
22
28
16
18

FIG. 3


14
Po
14s2
(14s)
14s2
(14s)
14s1
(14s)
B2
B1
B2
26
24a
24
22
28
12
16
18
Ax

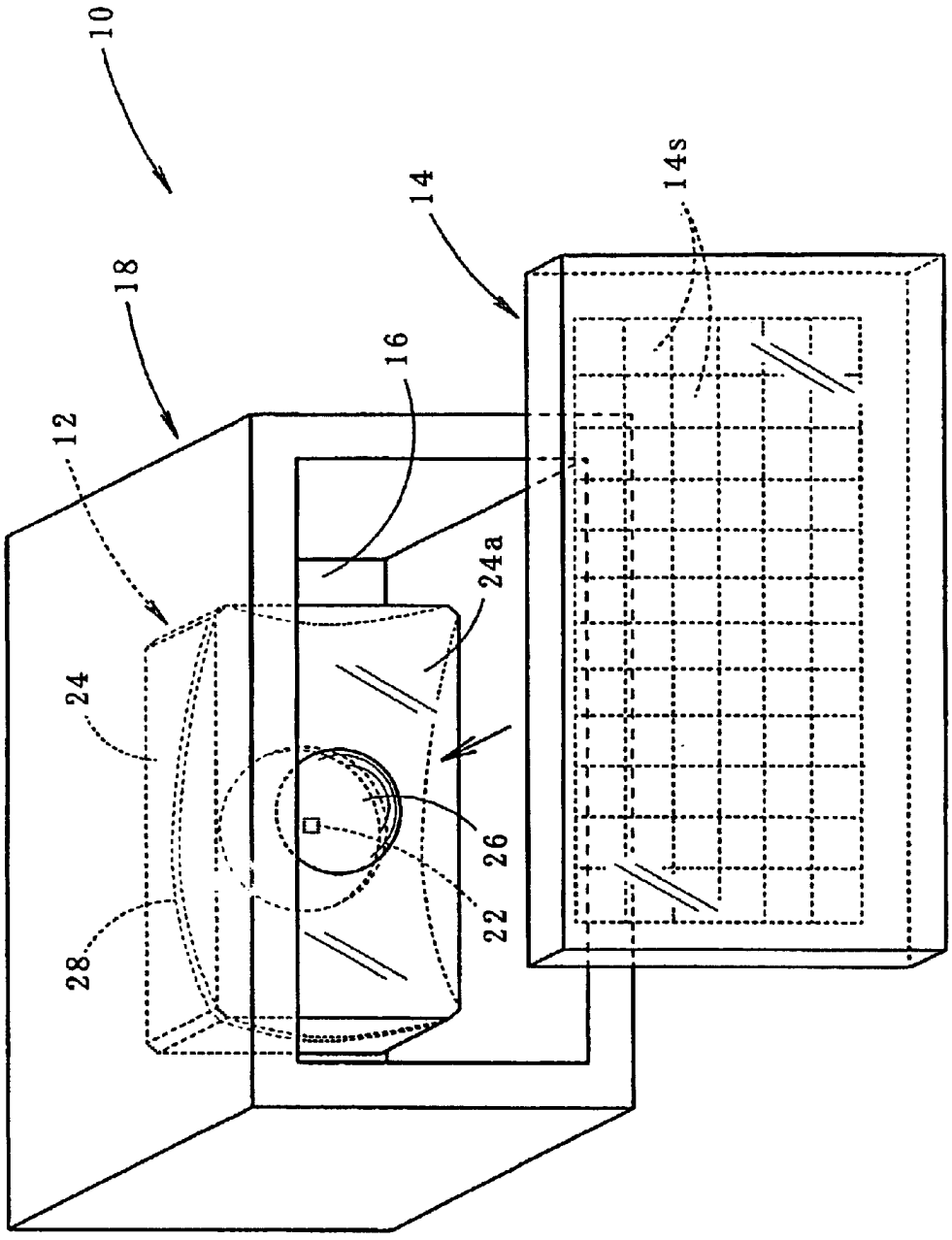



FIG. 4

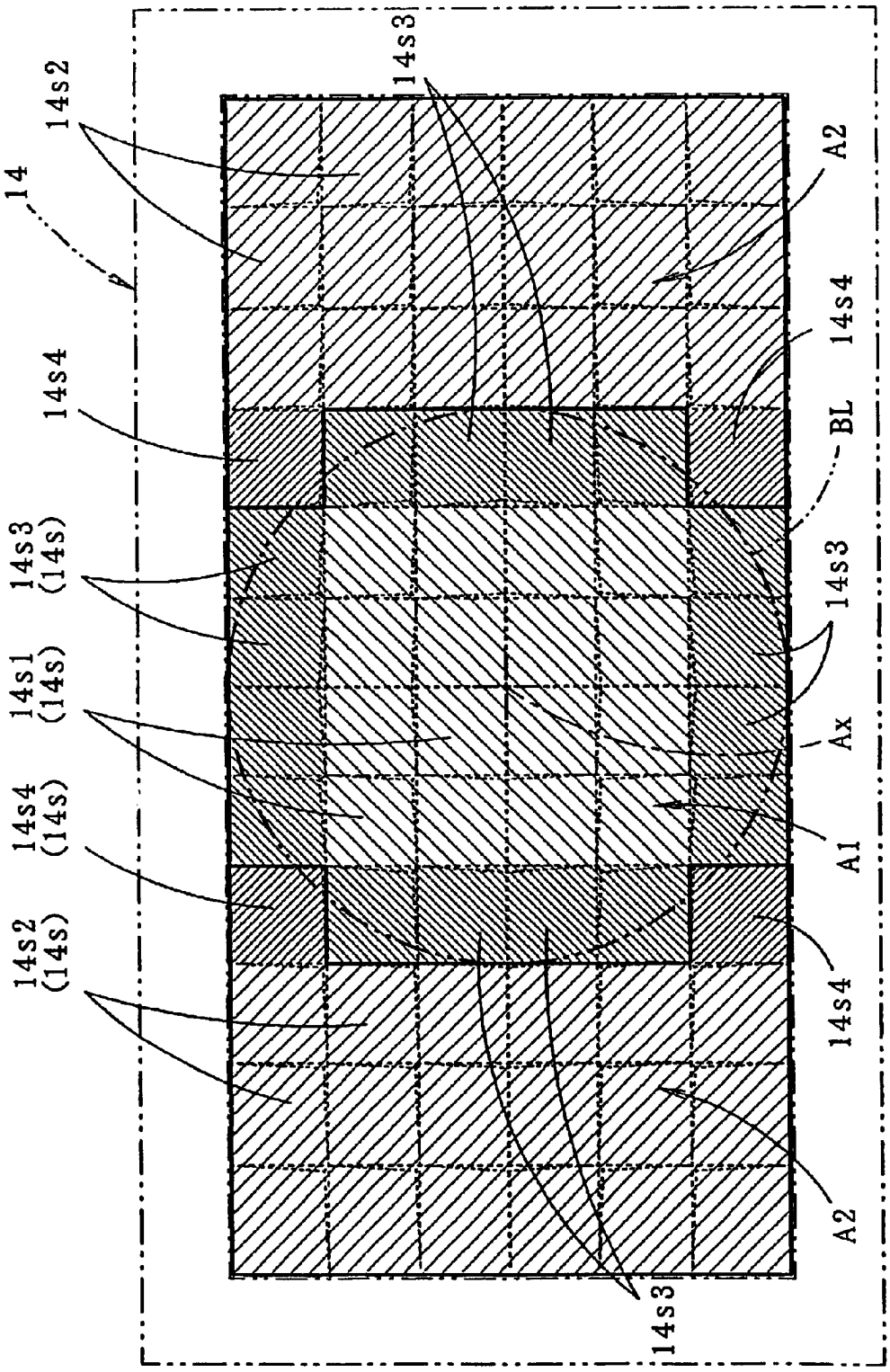

14
14s2
14s3
A2
14s4
BL
14s4
14s3
(14s)
14s3
14s1
(14s)
Ax
14s4
(14s)
A1
14s2
(14s)
14s4
A2
14s3

FIG. 5

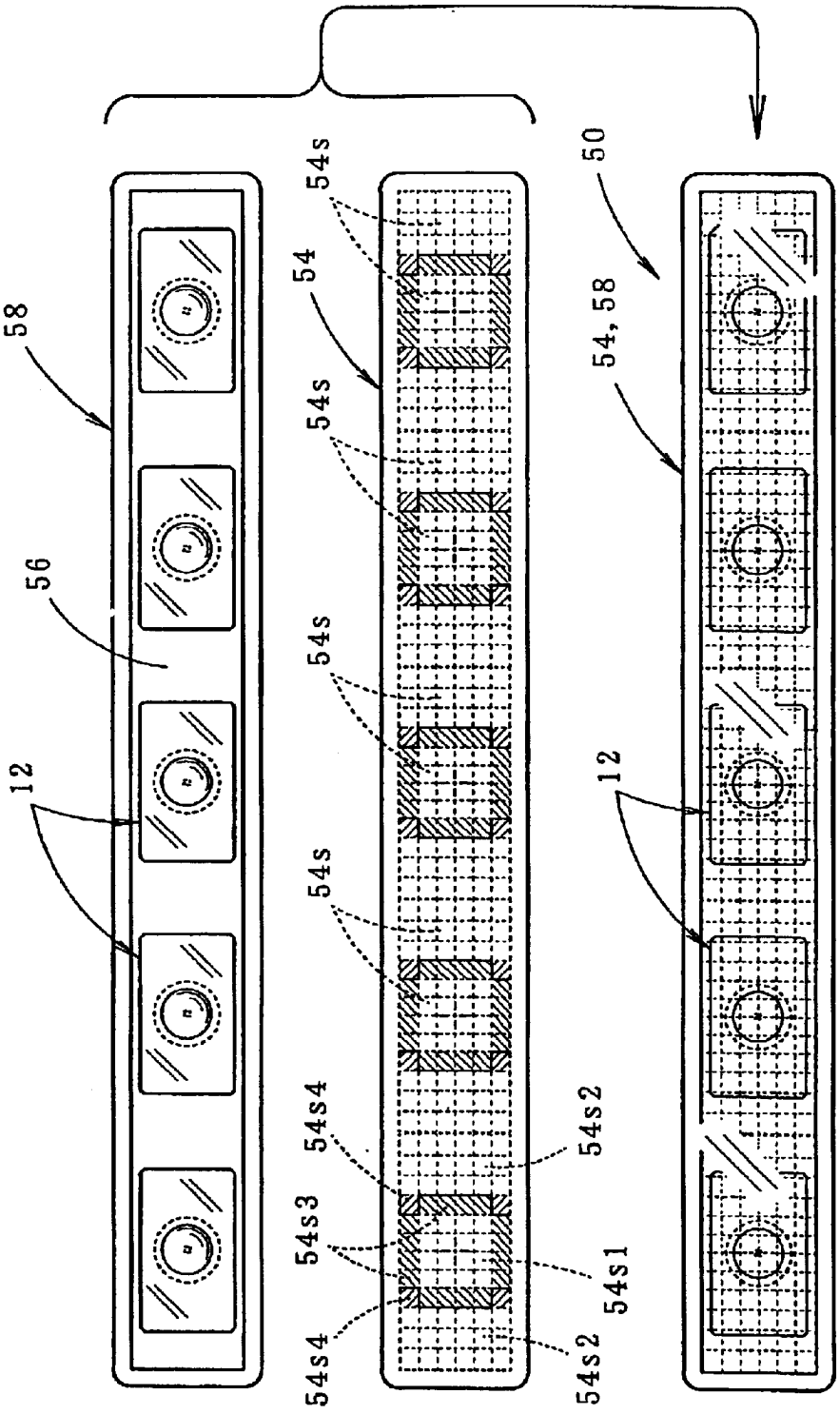



FIG. 6(a) FIG. 6(b) FIG. 6(c)

FIG. 7

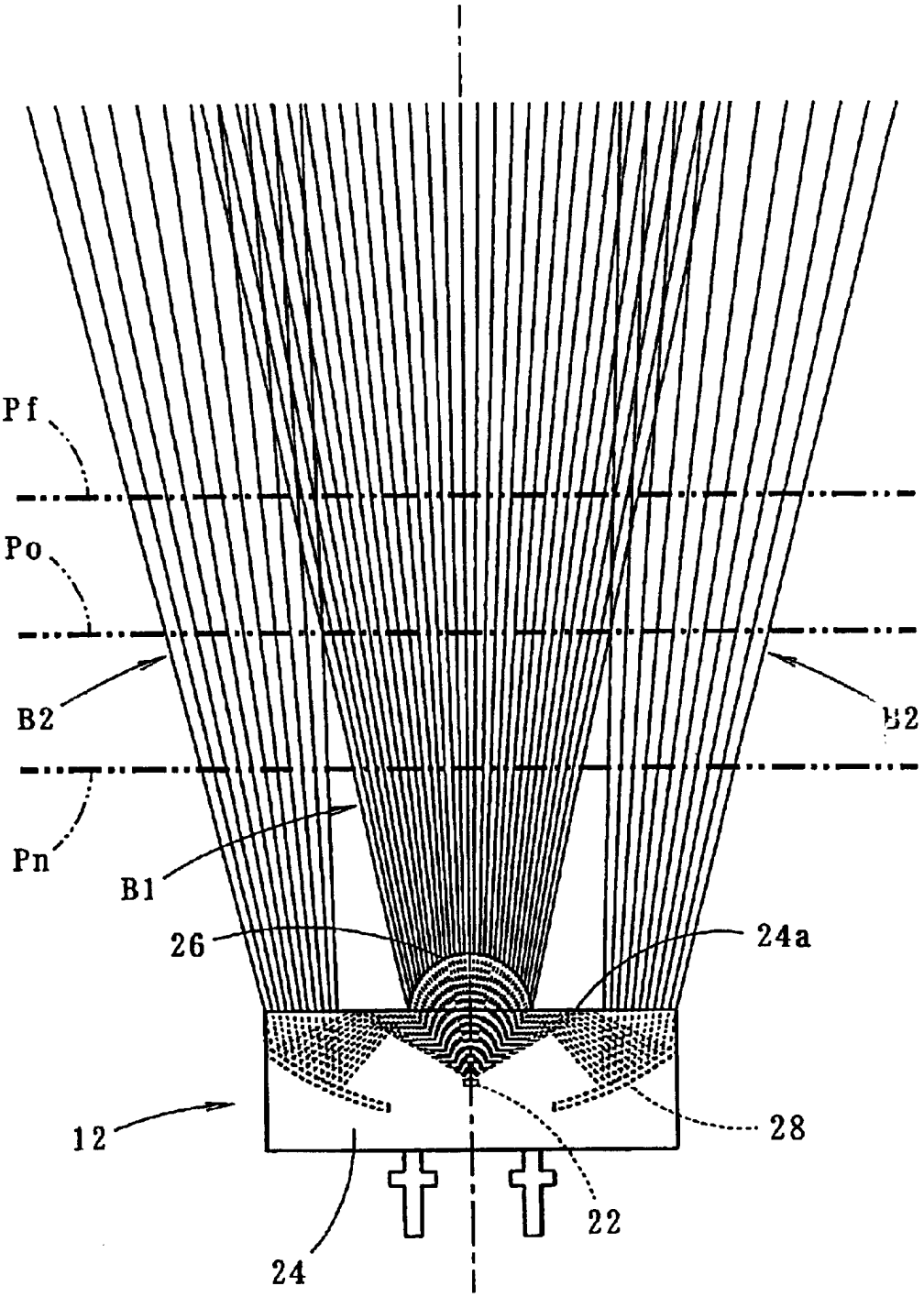
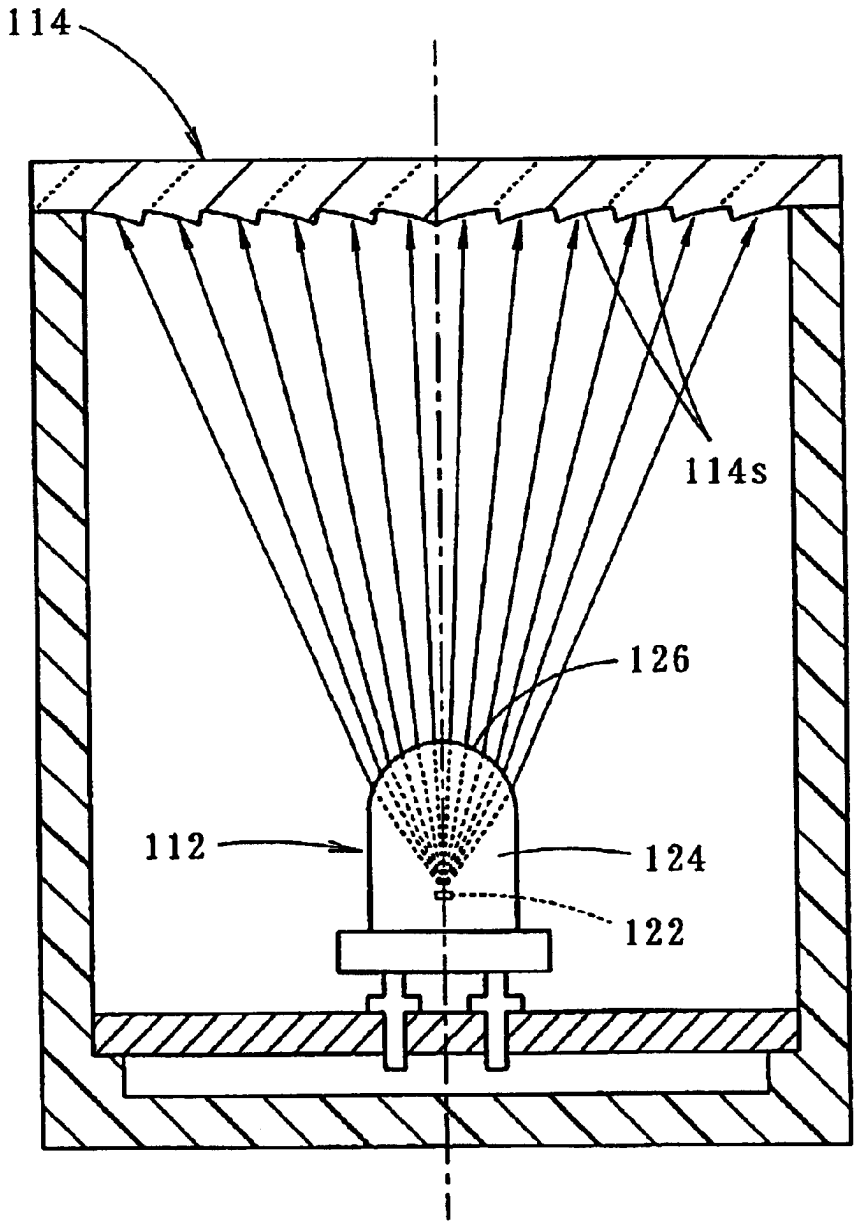


FIG. 8

PRIOR ART



# VEHICLE LAMP

## BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a vehicle lamp that uses, as a light source thereof, a special LED or a custom LED which is different from an ordinary LED.

2. Prior Art

A lamp structure that employs LEDs (light emitting diodes) is often adopted for vehicle lamps such as high-mount stop lamps and the like.

In such a vehicle lamp that uses LEDs, as shown in FIG. **8**, the light from an LED **112** is subjected to a diffusion deflection control by a plurality of lens elements **114***s* formed on a front lens **114** provided in front of the LED **112**. However, since the LED **112** emits only a small amount of light, it is difficult to produce a sufficient amount of illumination light for a vehicle lamp.

More specifically, as seen from FIG. **8**, in an ordinary LED **112**, of the light radiated from an LED chip **122** that is embedded in a bullet-shaped translucent body **124**, the radiation light within a predetermined range of angle with respect to the forward direction of the lamp is used by way of rendering it to be refracted toward the front with the use of a substantially semi-spherical condenser lens **126** that forms the front end portion of the translucent body **124**. However, the light radiated at a great radiation angle with respect to the forward direction becomes stray light and therefore cannot be used for illumination. Accordingly, a vehicle lamp that incorporates the LED **112** as described above cannot easily provide a sufficient amount of illumination light

The alternative is a method in which, instead of an ordinary LED, a special LED **12** as shown in FIG. **7** is used as a light source of a vehicle lamp.

In this special LED **12**, of the light radiated from an LED chip **22** embedded in a translucent block body **24**, the radiation light within a predetermined range of angle with respect to the forward direction is used, as in an ordinary LED, by way of rendering it to be refracted toward the front with the use of a condenser lens **26** that is formed to protrude in a substantially semi-spherical shape from the front end surface **24***a* of the translucent block body **24**. As to the light radiated at a great radiation angle with respect to the forward direction, such is used also by reflecting the light by a portion of the front end surface **24***a* of the translucent block body **24** that is an area around the condenser lens **26** and then reflecting it by a reflector **28** provided inside the translucent block body **24**.

With the use of the special LED **12**, the utilization efficiency of the light radiating from the LED chip **22** increases, and as a result, the amount of light emitted increases also. It becomes thus possible to provide a sufficient illumination light intensity required for vehicle lamps.

However, a mere disposing of a front lens in front of the special LED **12** causes problems.

More specifically, in FIG. **7**, the direct light B**1** passing through the condenser lens **26** does not form a bundle of parallel rays, and it forms a bundle of diffused rays. Accordingly, the direct light B**1** starts to intersect with the reflection light B**2**, which is from the reflector **28**, at a position Po that is some distant in front of the special LED **12**.

As a result, when the front lens is disposed at a position Pf that is greatly apart from the special LED **12**, the front lens has an overlapped incidence area where the overlapped direct light B**1** and reflection light B**2** are incident. Therefore, in the overlapped incidence area, the direct light B**1** and the reflection light B**2** are inevitably subjected to the same diffusion deflection control. However, the direct light B**1** and the reflection light B**2** have different directions of incidence on the front lens, and the direct light B**1** has a greater luminous intensity than the reflection light B**2**. Thus, the problem is that a diffusion deflection control on light from the special LED **12** by means of the front lens cannot be done appropriately.

Conversely, if the front lens is disposed at a position Pn that is closer to the special LED **12**, the direct light B**1** and the reflection light B**2** impinge on the front lens without any intersection, so that the front lens has a no-light impinging area where no light from the special LED **12** is incident. The no-light impinging area appears as a ring-shaped dark area when the lamp is on. Thus, the problem is that the appearance of the lamp is degraded.

## SUMMARY OF THE INVENTION

Accordingly, the present invention is to solve the problems described above.

It is an object of the present invention to provide a vehicle lamp that includes a special LED or a custom LED wherein the lamp is capable of appropriately performing diffusion deflection control on the light from the special LED by means of a front lens without degrading the appearance of the lamp.

The present invention achieves the object by contriving the layout of a front lens.

More specifically, the above object is accomplished by a unique structure of the present invention for a vehicle lamp that includes a special LED, which is a light source, and a front lens, which is provided in front of the special LED and performs a diffusion deflection control of light from the special LED by a plurality of lens elements formed on the front lens; and in the present invention,

the special LED is comprised of a translucent block body, an LED chip embedded in the translucent block body, a condenser lens protruded in a substantially semi-spherical shape on the front end surface of the translucent block body and positioned in front of the LED chip, and a reflector provided inside the translucent block body so as to forwardly reflect the light originated by the LED chip and reflected by a portion of the front end surface of the translucent block body that is a peripheral area of the condenser lens; and

the front lens is disposed near a position where the direct light from the LED chip and passing through the condenser lens and a reflection light reflected by the reflector start to intersect with each other.

The front lens can take any structure in terms of layout and shape of each lens element formed thereon as long as the front lens is designed so that the light from the special LED is subjected to a diffusion deflection control by the lens elements.

Each lens element can be a lens element that merely has a function of diffusing incident light or be a lens element that merely has a function of deflecting the incident light. Furthermore, it can be a lens element that has functions to diffuse and deflect the incident light.

In the vehicle lamp of the present invention, the special LED, which is the light source, is comprised of a translucent block body, an LED chip embedded in the translucent block

body, a condenser lens protruded in a substantially semi-spherical shape on the front end surface of the translucent block body and positioned in front of the LED chip, and a reflector provided inside the translucent block body so as to forwardly reflect the light originated by the LED chip and reflected by a portion of the front end surface of the translucent block body that is an area around the condenser lens. Accordingly, the light irradiated from the LED chip in directions within a predetermined range of angle with respect to the front of the LED chip is refracted toward the front by the condenser lens and can be used for illumination, and in addition the light radiating at great radiation angles with respect to the forward direction can be also used as reflection light from the reflector. Accordingly, the use efficiency of the radiation light from the LED chip is improved, and the amount of light emitted is increased. Consequently, the lamp sufficiently provides an amount of illumination light required for a vehicle.

In the vehicle lamp of the present invention, the light from the special LED is subjected to a diffusion deflection control by a plurality of lens elements of the front lens provided in front of the special LED. Since the front lens is disposed near the position where the direct light passing through the condenser lens and the reflection light from the reflector start to intersect with each other, the lamp has various advantages.

Though the direct light and the reflection light differ from each other in the direction of incidence and the intensity, since the front lens is disposed near the position at which the direct light and the reflection light start to intersect with each other, the formation of an overlapped incidence area in the front lens where the overlapped direct and reflection lights is incident is avoided. Thus, it is possible to appropriately perform the diffusion deflection control on the light from the special LED by means of the front lens.

Furthermore, since the front lens is disposed near the position where the direct light and the reflection light start to intersect with each other, the formation of a ring-shaped no-light impinging area in the front lens where no light from the special LED is incident is prevented. Thus, the front lens appears bright over the entire surface when the lamp is on, and appearance degradation of the lamp is prevented.

As seen from the above, according to the present invention, a vehicle lamp that includes a special LED appropriately performs a diffusion deflection control on the light that is from the special LED by means of the front lens without causing any degradation in the appearance of the lamp.

In the meantime, as described above, the direct light passing through the condenser lens has a higher light intensity than the reflection light from the reflector. Therefore, if, of the plurality of lens elements that form the front lens, a lens element positioned in a direct light impinging area where the direct light impinges has a diffusion angle that is set at a value which is greater than a diffusion angle of a lens element positioned in a reflection light impinging area where the reflection light impinges, then the entire front lens appears substantially uniformly bright when the lamp is on. The appearance of the lamp is thus enhanced.

Meanwhile, the borderline between the direct light impinging area and the reflection light impinging area appears in a substantially circular shape on the front lens. Accordingly, if a plurality of lens elements are disposed in a grid pattern, some of the lens elements are positioned on the borderline between the direct light impinging area and the reflection light impinging area. In such a structure, by way of setting the diffusion angle of each lens element positioned on the border line at a diffusion angle that is set for the lens element of the two areas that correspond to one of the direct light and the reflection light that impinges in a greater amount, it becomes possible to perform a sufficiently appropriate diffusion deflection control.

The vehicle lamp of the present invention uses either a single special LED or a plurality of special LEDs as a light source.

When a plurality of special LEDs are employed, they are disposed so as to have an aligned irradiation direction. In this structure that uses a plurality of special LEDs, the front lens includes a plurality of lens elements that perform, for each one of the special LEDs, the diffusion deflection control on the light from the special LEDs. Thus, the front lens appears bright for a broad luminescent area.

Furthermore, it can be designed so that a plurality of special LEDs are disposed in a row and each special LED has a substantially rectangular shape that is elongated in the direction of the row or linear arrangement of the LEDs. With this structure, a thin-type lamp structure suitable for a high-mount stop lamp or the like can easily be produced.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a front view of a vehicle lamp according to one embodiment of the present invention;

FIG. **2** is a sectional view taken long the line **2**—**2** in FIG. **1**, illustrating the vehicle lamp;

FIG. **3** shows the detail of the light path in the structure of FIG. **2**;

FIG. **4** is an exploded perspective view of the vehicle lamp of the present invention;

FIG. **5** is a front view of a plurality of lens elements that make a front lens of the vehicle lamp of the present invention;

FIG. **6**(*a*) is a front view of a lamp body with five special LEDs mounted thereon, FIG. **6**(*b*) is a front view of a front lens therefor, and FIG. **6**(*c*) is a front view in which the lamp body and the front lens are assembled into a vehicle lamp;

FIG. **7** shows a single special LED used in the embodiment of the present invention; and

FIG. **8** shows in cross section a conventional vehicle lamp that uses an LED.

## DETAILED DESCRIPTION OF THE INVENTION

Embodiments of the vehicle lamp according to the present invention will be described below in detail with reference to the accompanying drawings.

As seen from FIGS. **1** through **4**, the vehicle lamp **10** in the shown embodiment is a small-size lamp unit. A plural number of vehicle lamps **10** can be arrange, for instance, side by side so that they make a marker lamp such as a tail lamp, a stop lamp, etc.

The vehicle lamp **10** includes a special LED **12** as a light source, a front lens **14** that is disposed in front of the special LED **12** and performs diffusion deflection control of the light from the special LED **12** by means of lens elements **14***s* formed thereon, a printed circuit board **16** supporting the special LED **12** thereon, and a lamp body **18** that contains the printed circuit board **16** and the special LED **12** and supports at a front end surface thereof the front lens **14**.

The special LED **12** is a custom LED assembly that is comprised of a translucent block body **24**, an LED chip **22**

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embedded in the translucent block body **24**, a condenser lens **26** protruded in a substantially semi-spherical shape on the front end surface **24***a* of the translucent block body **24** so as to be located in front of the LED chip **22**, and a reflector **28** that reflects the light that is from the LED chip **22** and is, as best seen from FIG. **2**, reflected (internally reflected) from the portion of the front end surface **24***a* of the translucent block body **24** that is located around the condenser lens **26**.

The special LED **12** has a substantially rectangular shape that is elongated in a lateral (horizontal) direction in the front view of the lamp (see FIG. **1**) and is disposed so that the LED chip **22** is positioned on a lamp optical axis Ax that extends in a front-back direction (or in the direction of the depth) of the lamp (see FIG. **2**).

The light which is from the LED chip **22** and is incident upon the condenser lens **26** is refracted toward the lamp optical axis Ax. Accordingly, the direct light B**1** passing through the condenser lens **26** forms a bundle of diffuse rays expanding in a conical shape about the lamp optical axis Ax. On the other hand, the reflection light B**2** from the reflector **28** forms a ring-shaped bundle of diffuse rays expanding about a conical plane with the lamp optical axis Ax being a center axis. The direct light B**1** forms a bundle of rays with higher light intensity than the reflection light B**2**.

The direct light B**1** and the reflection light B**2** start to intersect with each other at a position Po (see also FIG. **7**) that is at a predetermined distance in front of the front end surface **24***a* of the translucent block body **24**.

The front lens **14** is, as best seen from FIGS. **2** and **3**, disposed near the position Po at which the direct light B**1** and the reflection light B**2** start to intersect with each other. A plurality of lens elements **14***s* that are formed on the front lens **14** are disposed in a grid pattern on the rear surface of the front lens **14**. The lens elements **14***s* diffuse and deflect the light from the special LED **12** toward the lamp optical axis Ax.

Of the lens elements **14***s*, lens elements **14***s***1** located in an direct light impinging area A**1** where the direct light B**1** impinges has a diffusion angle that is set at a greater value than the diffusion angle of lens elements **14***s***2** located in a reflection light impinging area A**2** where the reflection light B**2** impinges. For example, the diffusion angle of the lens elements **14***s***1** is set at 8° in the upward, downward, left and right directions from an axis parallel to the lamp optical axis Ax, and the diffusion angle of the lens elements **14***s***2** is set at 3° in the upward, downward, left and right directions from an axis parallel to the lamp optical axis Ax.

As seen from FIG. **5**, a plurality of lens elements **14***s* are formed on the front lens **14**.

The borderline BL between the direct light impinging area A**1** and the reflection light impinging area A**2** appears in a substantially circular shape on the front lens **14**. Accordingly, some lens elements such as those referred to as the reference numerals **14***s***3** and **14***s***4** are located on the borderline BL. Accordingly, the diffusion angle of each of the lens elements **14***s***3** and **14***s***4** is set at a diffusion angle set for the lens element of the areas that correspond to either one of the direct light B**1** and the reflection light B**2** that is incident in a greater amount. More specifically, the lens elements **14***s***3** where the direct light B**1** impinges in greater amounts than the reflection light B**2** has a diffusion angle that is equal to the diffusion angle of the lens elements **14***s* **1** located in the direct light impinging area A**1**. The lens elements **14***s***4** where the reflection light B**2** impinges in greater amounts has a diffusion angle that is equal to the diffusion angle of the lens elements **14***s***2** located in the reflection light impinging area A**2**.

As described above, the vehicle lamp **10** in the shown embodiment employs the special LED **12** as the light source; and the light radiating from the LED chip **22** of the special LED **12** in directions within a predetermined range of angle with respect to the forward direction relative to the LED chip **22** is used by way of refracting the light toward the forward direction by the condenser lens **26** of the special LED **12**. Furthermore, the light radiating at great radiation angles with respect to the forward direction can also be utilized as a reflection light from the reflector **28** of the special LED **12**.

Therefore, the radiation light from the LED chip **22** is used efficiently, and the light having an increased intensity is emitted. It becomes thus possible to sufficiently provide an illumination light intensity required for a vehicle.

In the vehicle lamp **10** of the shown embodiment, the light from the special LED **12** is subjected to a diffusion deflection control by a plurality of lens elements **14***s* formed on the front lens **14** that is provided in front of the special LED **12**. Since the front lens **14** is disposed near the position Po where the direct light B**1** passing through the condenser lens **26** and the reflection light B**2** from the reflector **28** start to intersect with each other, the lamp has various advantages.

More specifically, though the direct light B**1** and the reflection light B**2** differ from each other in the direction of incidence and the intensity of light, since the front lens **14** is disposed near the position Po at which the direct light B**1** and the reflection light B**2** start to intersect with each other, the formation of an overlapped incidence area in the front lens where the overlap between the direct light B**1** and the reflection light B**2** is incident is avoided. Accordingly, it becomes possible to appropriately perform the diffusion deflection control on the light from the special LED **12** by the front lens **14**.

Furthermore, since the front lens **14** is disposed near the position Po where the direct light B**1** and the reflection light B**2** start to intersect with each other, it is possible to prevent the formation of a no-light impinging area in the front lens **14** where no light from the special LED **12** is incident. Thus, the front lens **14** appears bright over the entire surface thereof when the lamp is on, and appearance degradation of the lamp is prevented.

Thus, according to the embodiment above, it is possible to appropriately perform the diffusion deflection control on the light from the special LED **12** by means of the front lens **14** without causing any degradation in the appearance of the lamp.

As described above, the direct light B**1** has a higher light intensity than the reflection light B**2**. In the embodiment, however, of the plurality of lens elements **14***s* that are formed on the front lens **14**, the lens elements **14***s***1** positioned in the direct light impinging area A**1** has a diffusion angle that is set at a value which is greater than the diffusion angle of the lens elements **14***s***2** located in the reflection light impinging area A**2**. Accordingly, the entire front lens **14** appears substantially uniformly bright when the lamp is on, and thus the appearance of the lamp is enhanced.

In the above embodiment furthermore, the plurality of lens elements **14***s* that are formed on the front lens **14** are arranged in a grid pattern. As for the lens elements **14***s***3** and **14***s***4** that are positioned on the borderline B**1** between the direct light impinging area A**1** and the reflection light impinging area A**2** that is formed in a substantially circular shape on the front lens **14**, the diffusion angle of each one of the lens elements **14***s***3** and **14***s***4** is set at a diffusion angle which is set for the lens elements disposed in the areas where either one of the direct light B**1** and the reflection light B**2**

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impinges in a greater amount. Accordingly, it becomes possible to perform sufficiently appropriate diffusion deflection control.

Modifications of the foregoing embodiment will be next described below with reference to FIGS. **6**(*a*) through **6**(*c*).

In the vehicle lamp **10** of the foregoing embodiment, a single special LED **12** is provided as a light source. In the vehicle lamp **50** in this modification, a plurality (five) of special LEDs **12** are provided.

More specifically, the special LEDs **12** are disposed linearly on one line at equal intervals in a lateral (horizontal) direction and are supported on a common printed circuit board **56**. The special LEDs **12** are disposed so that the irradiation directions are aligned to the same direction. Each special LED **12** is disposed so that the special LED **12** is long in the lateral direction as in the foregoing embodiment.

The printed circuit board **56** is, together with the special LEDs **12**, supported by a lamp body **58**. A front lens **54** is provided on the front end surface of the lamp body **58**.

The front lens **54** has a plurality of lens elements **54***s* that are disposed so as to correspond to the individual special LEDs **12** for diffusion deflection control of the light from the special LEDs **12**. The lens elements **54***s***1**, **54***s***2**, **54***s***3** and **54***s***4** that respectively correspond to the lens elements **14***s***1**, **14***s***2**, **14***s***3** and **14***s***4** of the foregoing embodiment are provided for each special LED **12**.

With the above structure in which a plural number of special LEDs **12** are disposed in the vehicle lamp **50**, the front lens **54** appear bright for a broad luminescent area.

In the vehicle lamp **50** shown in FIGS. **6**(*a*) through **6**(*c*), the special LEDs **12** are disposed linearly on one line at equal intervals in the lateral (horizontal) direction, and each special LED **12** had a substantially rectangular shape that is elongated in the lateral direction. Accordingly, this structure is applicable to a thin-type lamp suited for a high-mount stop lamp or the like.

Instead of the arrangement of the special LEDs **12** in a linear fashion in one row as in the foregoing modification, a plurality of special LEDs **12** can be disposed linearly in a plurality of rows. Furthermore, a plurality of special LEDs **12** can be disposed in one or more rows in an arc or wave shape.

What is claimed is:

**1**. A vehicle lamp comprising a special LED, which is a light source, and a front lens, which is provided in front of the special LED and performs a diffusion deflection control of light from the special LED by a plurality of lens elements formed on the front lens, wherein

the special LED comprises:

a translucent block body,

an LED chip embedded in the translucent block body,

a condenser lens protruded in a substantially semi-spherical shape on a front end surface of the translucent block body and positioned in front of the LED chip, and

a reflector provided inside the translucent block body and forwardly reflects light that is originated from the LED chip and reflected by a portion of the front end surface of the translucent block body that is a peripheral area of the condenser lens, and wherein

the front lens is disposed near a position where direct light passing through the condenser lens and reflection light from the reflector start to intersect with each other.

**2**. The vehicle lamp according to claim **1**, wherein of the plurality of lens elements formed on the front lens, a lens element positioned in a direct light impinging area where the direct light impinges has a diffusion angle that is set at a value which is greater than a diffusion angle of a lens element positioned in a reflection light impinging area where the reflection light impinges.

**3**. The vehicle lamp according to claim **2**, wherein:

the plurality of lens elements are disposed in a grid pattern, and

the diffusion angle of a lens element positioned on a borderline between the direct light impinging area and the reflection light impinging area is set at a diffusion angle that is set for a lens element which is set for a greater impinging amount between the direct light and the reflection light.

**4**. The vehicle lamp according to claim **3**, wherein:

a plurality of special LEDs are disposed in a manner that the special LEDs have an aligned irradiation direction, and

the front lens is formed with a plurality of lens elements that perform a diffusion deflection control of light from the special LEDs for each one of the special LEDs.

**5**. The vehicle lamp according to claim **4**, wherein a plurality of special LEDs are disposed in a row, and each of the special LEDs has a substantially rectangular shape that is elongated in a direction of the row arrangement of the LEDs.

**6**. The vehicle lamp according to claim **1**, wherein:

a plurality of special LEDs are disposed in a manner that the special LEDs have an aligned irradiation direction, and

the front lens is formed with a plurality of lens elements that perform a diffusion deflection control of light from the special LEDs for each one of the special LEDs.

**7**. The vehicle lamp according to claim **6**, wherein a plurality of special LEDs are disposed in a row, and each of the special LEDs has a substantially rectangular shape that is elongated in a direction of the row arrangement of the LEDs.

**8**. The vehicle lamp according to claim **2**, wherein:

a plurality of special LEDs are disposed in a manner that the special LEDs have an aligned irradiation direction, and

the front lens is formed with a plurality of lens elements that perform a diffusion deflection control of light from the special LEDs for each one of the special LEDs.

**9**. The vehicle lamp according to claim **8**, wherein a plurality of special LEDs are disposed in a row, and each of the special LEDs has a substantially rectangular shape that is elongated in a direction of the row arrangement of the LEDs.

* * * * *

PTO/SB/08a (02-18)
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# INFORMATION DISCLOSURE STATEMENT BY APPLICANT

**( Not for submission under 37 CFR 1.99)**

| | |
|---|---|
| Application Number | |
| Filing Date | |
| First Named Inventor | Yechezkal Evan Spero |
| Art Unit | N/A |
| Examiner Name | N/A |
| Attorney Docket Number | TRCH0102RX |

**U.S.PATENTS**

| Examiner Initial* | Cite No | Patent Number | Kind Code[1] | Issue Date | Name of Patentee or Applicant of cited Document | Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear |
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| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | |
| | Filing Date | |
| | First Named Inventor | Yechezkal Evan Spero |
| | Art Unit | N/A |
| | Examiner Name | N/A |
| | Attorney Docket Number | TRCH0102RX |

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|---|---|---|---|---|---|---|---|---|
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| INFORMATION DISCLOSURE STATEMENT BY APPLICANT ( Not for submission under 37 CFR 1.99) | | |
|---|---|---|
| | Application Number | |
| | Filing Date | |
| | First Named Inventor | Yechezkal Evan Spero |
| | Art Unit | N/A |
| | Examiner Name | N/A |
| | Attorney Docket Number | TRCH0102RX |

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Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

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☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

**SIGNATURE**

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

| Signature | /Sangeeta G. Shah/ | Date (YYYY-MM-DD) | 2021-07-30 |
|---|---|---|---|
| Name/Print | Sangeeta G. Shah | Registration Number | 38,614 |

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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

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**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

YECHEZKAL EVAN SPERO

Patent No.: 9,955,551

Control No.: N/A

Filed: July 30, 2021

Group Art Unit: N/A

Examiner: N/A

Request for Reexamination Under U.S.C §§ 302-307 and 37 C.F.R. §1.510

For: DETECTOR CONTROLLED ILLUMINATING SYSTEM

Attorney Docket No.: TRCH0102RX

**PATENT OWNER REQUEST FOR *EX PARTE* REEXAMINATION**
**OF U.S. PATENT NO. 9,955,551 INCLUDING AMENDMENT**

Mail Stop *Ex Parte* Reexamination
Attn: Central Reexamination Unit
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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## EXHIBIT LIST

| Exhibit No. | Description |
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| PAT-A | U.S. Patent No. 9,955,551 Spero |
| PA-A | International Publication No. WO 01/70538 Stam PCT |
| PA-B | U.S. Patent No. 6,406,172 Harbers et al. |
| PA-C | U.S. Patent No. 6,281,632 Stam et al. |
| PA-D | U.S. Patent No. 6,587,573 Stam et al. |
| PA-E | U.S. Patent No. 6,861,809 Stam et al. |
| SB08 | U.S. Patent and Trademark Office form SB08 |
| OTH-A | Stam Declaration |
| OTH-B | Stam C.V. |
| OTH-C | New Claims |
| OTH-D | Support for proposed amendments |
| OTH-E | Industry praise nexus support document |
| OTH-F | Side by side comparison |
| OTH-G | European Patent No. EP1391347 B1 Krukenbaum et al. |
| OTH-H | U.S. Patent No. 6,752,523 Takahashi |

## OTHER EXHIBITS AND SUPPORTING DOCUMENTATION

| Exhibit No. | Description | Identifier |
|---|---|---|
| Exhibit 1 | Vijayenthiran, Vinesh, "A look at the new LED headlights on the Lexus LS600H," May 14, 2007 https://www.motorauthority.com/news/1027394_a-look-at-the-new-led-headlights-on-the-lexus-ls600h, permalink https://perma.cc/Y8XS-GAA8 | Motor Authority |
| Exhibit 2 | Wayback Machine – Internet Archive, "LED headlights – Audi Technology Portal," November 16, 2014 https://web.archive.org/web/20141116034803/https://www.audi-technology-portal.de/en/electrics-electronics/lighting-technology/led-headlights, permalink https://perma.cc/7W6N-D6T9 | Audi Technology Portal |
| Exhibit 3 | Tamburo, R. et al. (2014) "Programmable Automotive Headlights", http://www.cs.cmu.edu/~ILIM/publications/PDFs/, permalink https://perma.cc/4SXQ-KXVA | Tamburo R. (2014) |
| Exhibit 4 | NHTSA Proposed Rule 2018 Published in Federal Register, Vol. 83, No. 198, Friday October 12, 2018, permalink https://perma.cc/57ZR-WSX2 | NHTSA Proposed Rule 2018 |
| Exhibit 5 | WayBack Machine – Internet Archive, "Koito Company History" https://www.koito.co.jp/english/corp/history/chronology.html First archive captured via WayBack Machine October 24, 2020 at 5:20 and 18 seconds https://web.archive.org/web/20201024172018/https://www.koito.co.jp/english/corp/history/chronology.html, permalink https://perma.cc/8HAW-S2SH | Koito |
| Exhibit 6 | WayBack Machine – Internet Archive, "HELLA Company History" First archive captured via WayBack Machine March 25, 2016 at 03:25 and 44 seconds https://web.archive.org/web/20160325044139/https://www.hella.com/hella-com/en/History-739.html, permalink https://perma.cc/8YR7-WF6H | HELLA |
| Exhibit 7 | Teague, Chris. "Here's How Smart Headlights Work," April 14, 2021, https://www.autoweek.com/news/technology/a36031601/heres-how-smart-headlights-work/, permalink https://perma.cc/QQ2G-F3BH | Autoweek |

| Exhibit No. | Description | Identifier |
|---|---|---|
| Exhibit 8 | Wayback Machine – Internet Archive, "AAA Research Report European Specifications vs US Headlamps," April 2019<br>First archive captured via WayBack Machine April 12, 2021 at 5:07 and 23 seconds<br>https://web.archive.org/web/20210412050723/https://newsroom.aaa.com/wp-content/uploads/2019/06/ResearchReportEuroSpecvsUSHeadlamps.pdf and<br>https://newsroom.aaa.com/wp-content/uploads/2019/06/ResearchReportEuroSpecvsUSHeadlamps.pdf, permalink<br>https://perma.cc/ULR2-HZ98 | AAA 2019 report |
| Exhibit 9 | WayBack Machine – Internet Archive, "Two Interesting New Lighting Systems from BMW," Driving Vision News, December 3, 2019<br>First archive captured via WayBack Machine July 13, 2021 at 12:42 and 04 seconds<br>https://web.archive.org/web/20210713144204/https://www.drivingvisionnews.com/news/2019/12/03/two-interesting-new-lighting-systems-from-bmw/ and<br>https://www.drivingvisionnews.com/news/2019/12/03/two-interesting-new-lighting-systems-from-bmw/, permalink https://perma.cc/PVR3-3PKD | Driving Vision News |
| Exhibit 10 | WayBack Machine – Internet Archive, "HELLA's LED Matrix Lighting Wins Automotive News PACE Award" PR Newswire April 8, 2014<br>First archive captured via WayBack Machine April 11, 2014 at 11:19 and 57 seconds<br>https://web.archive.org/web/20140411221957/https://www.prnewswire.com/news-releases/hellas-led-matrix-lighting-wins-automotive-news-pace-award-254371771.html and<br>https://www.prnewswire.com/news-releases/hellas-led-matrix-lighting-wins-automotive-news-pace-award-254371771.html, permalink<br>https://perma.cc/79QJ-EZZU | PR Newswire |
| Exhibit 11 | Alliance for Automotive Innovation submission August 5, 2020<br>Retrieved from<br>https://www.regulations.gov/comment/NHTSA-2018-0090-0219, permalink https://perma.cc/8HX8-DZPA | Alliance for Automotive Innovation |

## I. Introduction

Yechezkal Evan Spero ("Spero"), Patent Owner, requests reexamination of claim 6 of U.S. Patent No. 9,955,551 ("the '551 Patent") in light of a substantial new question of patentability raised by prior art not considered by the examiner during prosecution of the '551 Patent, specifically International Publication No. WO01/70538 ("Stam PCT"), and U.S. Patent No. 6,406,172 ("Harbers"). Patent Owner also submits new claims 24-87, which narrow base claim 6.

Accordingly, the Patent Owner requests that the Office find a substantial new question of patentability with respect to claim 6, order reexamination, and issue a reexamination certificate confirming the patentability of claim 6 in addition to the proposed new claims submitted herewith.

## II. Requirements for *Ex Parte* Reexamination Under 37 C.F.R. § 1.510

Patent Owner satisfies each requirement for *ex parte* reexamination of the '551 Patent as stated below.

### A. 37 C.F.R. § 1.510(b)(1): Statement Pointing Out Each Substantial New Question of Patentability

A statement pointing out each substantial new question of patentability ("SNQ") based on the cited patents in accordance with 37 C.F.R. § 1.510 (b)(1) and (b)(2) is provided in Section VII.

### B. 37 C.F.R. § 1.510(b)(2): Detailed Explanation of the Pertinency and Manner of Applying the Prior Art

See Sections IV, VII and IX.

### C. 37 C.F.R. § 1.510(b)(3): Copy of Every Patent or Printed Publication Cited Against the Claims

Exhibits PA-A and PA-B are the Stam PCT Publication and Harbers respectively:

PA-A Stam PCT

PA-B Harbers

References PA-A and PA-B are also listed on Exhibit SB08 (*i.e.*, Form PTO-SB/08.)



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### D. 37 C.F.R. § 1.510(b)(4): Copy of the Entire Patent

A full copy of the '551 Patent is submitted herein as Exhibit PAT-A in accordance with 37 C.F.R. §1.510(b)(4).

### E. 37 C.F.R. § 1.510(a): Fee for Requesting Reexamination

In accordance with 37 C.F.R. § 1.510(a), the reexamination fee has been paid as part of the EFS-WEB submission. Any deficiency or overpayment may be debited/credited to Deposit Account No. 023978.

### F. Related Matters

The following is a current list of all matters involving the '551 Patent:

U.S. Patent Application 15/961,861 filed on April 24, 2018, which issued on January 19, 2021 as U.S. Patent No. 10,894,503 is a continuation of the '551 Patent. U.S. Patent Application 16/853,342 filed on April 24, 2020 is a continuation of the '551 Patent and is currently pending.

Reissue application, 16/858,342, was filed on April 24, 2020. This broadening reissue application includes a total of 44 claims, including claim 6 of the original '551 Patent, which is also included in this reexamination request. Accordingly, while there may be some overlapping subject matter, the newly added and currently pending reissue claims relate to light sources for illuminating subareas of an interior space and more specifically, claims directed to a room-illumination system for adjusting light responsive to lighting characteristics within a room. In contrast, the proposed new claims in this request for *ex parte* reexamination narrow claim 6.

If this request for *ex parte* reexamination results in a determination and order for *ex parte* reexamination under 35 U.S.C. § 1.525, it will result in concurrent office proceedings, under 37 C.F.R. § 1.565 and MPEP § 2285. Merger of the reissue and *ex parte* reexamination proceedings is, however, inappropriate in this particular situation because merger would result in "the patent

owner [being] required to place and maintain the same claims in the reissue application and the *ex parte* reexamination proceeding during the pendency of the merged proceeding." As the reissue application is a broadening reissue, the new claims are broader and different than the originally issued patent claims – thus, by statute, the new claims are not subjectable to consideration in an *ex parte* reexamination proceeding. Accordingly, a merged proceeding is statutorily impermissible as these claims cannot be permissibly added to the reexamination proceeding to maintain matching claim sets.

A stay of either proceeding is also inappropriate, in view of the requirement to conduct reexamination and reissue proceedings with "special dispatch" per 35 U.S.C. § 305 and MPEP § 2261. As the reissue application was filed over one year ago and has not received an office action to-date, any further delay would significantly prejudice patent owner's ability to obtain additional claims within the '551 Patent term, which expires in January, 2026. Given the limited patent term remaining, stay of either the *ex parte* reexamination or reissue proceeding would lead to significant prejudice to the patent owner.

Finally, should a minor inconsistency arise between the two concurrent proceedings, it can be readily rectified by a housekeeping amendment, prior to issuance.

## III. Claim Construction

### A. Standard of Claim Construction

In an *ex parte* reexamination, claims are to be given their "broadest reasonable interpretation" consistent with the specification and consistent with the interpretation that those skilled in the art would reach. MPEP § 2111. The "broadest reasonable interpretation does not mean the broadest possible interpretation." *Id.* Notwithstanding the broadest reasonable interpretation rubric, the Federal Circuit has repeatedly rejected PTO constructions that are



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"unreasonably broad" and "inconsistent" with the language of the specification. *In re Suitco Surface, Inc.*, 603 F.3d 1255, 1260 (Fed. Cir. 2010); *see also TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1062 (Fed. Cir. 2016) ("Construing words of a claim without considering the context in which those words appear is simply not 'reasonable'; Furthermore, "[w]hile the broadest reasonable interpretation standard is broad, it does not give the Board an unfettered license to interpret the words in a claim without regard for the full claim language and the written description."). A patent applicant may consistently and clearly use a term in a manner either more or less expansive than its general usage in the relevant art, thereby expanding or limiting the scope of the term in the context of the patent claims. *See SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1343–44 (Fed. Cir. 2001).

### B. Summary of Claim Construction Position

As detailed in the Stam declaration and consistent with the specification in the '551 Patent and the usage of the term in the claims, a person of ordinary skill in the art (POSITA) would understand the term *light source* to mean individual LED.[1] (Ex. OTH-A, "Stam Decl." at ¶20.)

Per the '551 Patent, the "invention comprises a novel multi-light source approach to the design and construction of **solid-state lighting fixtures** (vs. solid-state lamps), which is termed a "**Digital Lighting Fixture**" **due to the control of individual lighting element "digits"** to provide the "correct" lighting solution for the situation at hand." (Ex. PAT-A, '551 Patent at 11:8-13, emphasis added.[2])

[1] For ease of reference, italicized font is used throughout to connote claim language.

[2] Notably, a person skilled in the art understands that HID is the abbreviation for high-intensity discharge (HID) lamps, which are a type of electrical gas-discharge lamp which produces light by means of an electric arc between tungsten electrodes housed inside a translucent or transparent fused quartz or fused alumina arc tube. (Ex. OTH-A at 12, fn 2.)

As the Detailed Description of the '551 Patent makes clear,

> **[t]he system is built around a "digital" light source**. That is, the emanating lighting effect is **the sum of the characteristics of a multiplicity of discretely controllable "digit" sources**. The difference between the **individual** "digit" **light sources** and their summation manifests itself in the resultant light characteristic, be in its intensity, spatial intensity distribution, spectral energy content and spectral intensity distribution. . . Therefore, the illuminating device may be described as a "digital" **light source** or as a Multiple Solid-state Light Source (MSLS), comprising many "digits," SLSs, and **essentially replaces the lamp of present-day luminaires**.

(Ex. PAT-A at 16:39 – 17:2, emphasis added.) Notably, "a person of ordinary skill in the art understands that a solid-state light source (SLS) uses light-emitting diodes as a light source, rather than electrical filaments, plasma or gas." (Ex. OTH-A at ¶20.)

The '551 Patent explains how the "digital aspect" of the illuminating device gives rise to "digital" "control capability" for individual LEDs or selectable groups of LEDs:

> The multiple light sources of specific characteristics provide quanta of power and spectrum which are smoothly added or detracted to generate a changed lighting effect. The digital aspect arises from the sufficient progression of values, varying by minutes to produce a continuum so as to be non-discernable or irrelevant to the user. **The added controllability is realized by breaking up the light-production, into discrete, specifically aimable, and dimmable elements which can be addressed by control electronics** for the purpose of affecting the intensity, spectrum and spatial distribution of spectrum and of intensity of the illumination provided by the luminaire of the present invention.
>
> The overall combination of control capability and discrete light sources yields a digital lighting fixture. The terminology "digital" as used herein refers to the discrete nature of the multiple LED lamps provided in the luminaire, whereby **"digital" control results from the individual control of the discrete, i.e.** "digital"

**lighting elements, the LEDs, in the luminaire**.

(Ex. PAT-A at 2:51-3:3, emphasis added; Ex. OTH-A at ¶21.)

The specification of the '551 Patent further demarcates the invention in relation to the prior art:

> **[t]he advance over prior art is a solid-state light source with increased**: 1. Efficiency—more effective lumen per watt electricity. 2. Durability—physical strength, life expectancy, lumen maintenance and spectral stability. 3. Lighting quality—as related to visual comfort and "atmosphere." 4. Functionality—ability to control the light placement, intensity and color temperature and do so as needed. 5. Energy savings 6. Lower overall lifecycle cost.

(Ex. PAT-A at 11:66-12:6, emphasis added.)

More specifically, the specification makes it clear that the desired control functionality is facilitated by the ability to break "the total light output into discrete (digital) specifically aimable and dimmable elements" and determine the "selection and placement of light sources" for the "correct lighting practice":

> **Integrating the light source with power conditioning electronics, control circuitry and sensors gives additional cost benefits and functionality including**: 1. Mass production capability 2. Sealed-for-life fixture 3. Exact optical performance less spill light 4. Compact design 5. Feedback control and recalibrated color consistency over the device lifetime 6. Real-time lighting needs adaptability.**...**
>
> **...**
>
> In summary, as opposed to **LED industry trends of going with a single large source, the present invention provides multiple smaller sized sources** of differing characteristics such that their combined effect is greater than that which could have been offered by sum of the individual parts operating separately. The added **controllability offered by breaking the total light output up into discrete**

**("digital") specifically aimable and dimmable elements which can be addressed by control electronics to effect intensity, spectrum and spatial distribution of intensity and spectrum, yields a lighting fixture (vs. lamp) of unparalleled performance.**

...

**Unique to this patent is the approach**. It is the approach of a lighting manufacturer who provides lighting solutions versus that of a lamp manufacturer who produces a generic lamp.

...

The process includes **determining: the correct lighting practice for the application; the surroundings; the selection and placement of light sources** and their integration with the mechanical support and; electronic control elements to realize the objective.

(Ex. PAT-A at 12:7-13, 24:37-47, 11:62-65, 13:63-65, emphasis added; Ex. OTH-A at ¶22.)

The specification of the '551 Patent also ties control functionality to the ability to "adjust power to SLS":

In a preferred embodiment the DLF contains **logic control electronics unit 7. Logic control electronics unit, 7, receives input and/or feedback from motion, intensity and/or spectral sensors 8, or from manual control button 9 and increases or decreases or turns on or shuts off the power to one or more of the SLS to effect the desired change**. That is, the control logic unit 7 has stored parameters for intensity and spectral distribution and operates the MSLS lamp within the predefined range. The control unit may include a DSP or computer with storage media, computer algorithms, signal input and output electronics, analog to digital converters, and communications elements to carry out intensity, distribution, dimming and color balance control. Computer algorithms and instruction sets 7A are induced by the logical controller to manipulate data, calculate results generate output signals and maintain the operating parameters within the specifications. **Measured parameters are checked against the store parameters and the**

**control circuitry adjusts the power to SLS.**

(Ex. PAT-A at 25:34-52; Ex. OTH-A at ¶22.)

Finally, the Field of the Invention expressly excludes traditional lighting sources: "[t]he invention relates to multiple light source illuminating devices **intended to replace** incandescent, fluorescent and HID luminaires in general and specialty lighting applications." (Ex. PAT-A at 1:33-35, emphasis added; Ex. OTH-A at ¶23.) While the specification provides a "laundry list of potential light sources" at 16:47-51, when read in the context of the overall specification and the usage of the term *light source* in the claims, the proffered construction follows. (Ex. OTH-A at ¶24.) Construing the term *light source* to include incandescent, fluorescent and HID light sources "doesn't make sense" in reference to the claims—see for example, claim 1 which requires a *multiplicity of independently controllable light sources*. (*Id.*)

Thus, pursuant to the broadest reasonable construction rubric, consistent with the teachings in the specification and the claim language, a person of ordinary skill in the art would construe the claim term *light source* to mean an individual LED. (Ex. OTH-A at ¶25.)

## IV. Background of Automotive Lighting Industry

The state of the automotive lighting industry in 2001-2002 can be gleaned from prior art patent filings. One reference in particular, U.S. Patent No. 6,281,632, filed on April 2000 and issued to *Stam et al.* (Ex. PA-C, "Stam '632"), serves as a guidepost on development efforts and the state of expert knowledge during the relevant time period. (Ex. OTH-A at ¶27.)

As of 2001, researchers were developing technologies for continuously variable headlamps, able to change the intensity of light and/or the direction of light emitted by the headlamps. (Ex. PA-C at 1:21-24.) According to the '632 patent, the intensity of headlamp illumination could be "accomplished in several different" ways by: 1) providing "a pulse width

modulated (PWM) signal to the headlamp and "varying the duty cycle of the headlamp power," 2) providing a "PWM signal to a lamp driver integrated circuit," 3) through high intensity discharge (HID) headlamps—" a new, highly efficient headlamp technology"—wherein "ballasts used to power HID lamps can be directly supplied with a control signal to vary headlamp illumination intensity"; and 4) providing "an attenuating filter to absorb some of the light emitted from the headlamp." (Ex. PA-C at 1:26-48; Ex. OTH-A at ¶27.) As the '632 patent filing evidences, there were also several known means for changing the direction of light emitted from headlamps:

> Headlamp aim can be varied using actuators [such as stepper motors] to move the headlamp housing relative to the vehicle. . .For headlamps with appropriately designed reflectors, mechanically moving the light source relative to the reflector can change headlamp beam direction as well as headlamp illumination intensity. Additionally, with HID headlamps, the headlamp beam can be aimed by "deflecting or perturbing the arc in such a way as to vary the lamp output.

(Ex. PA-C at 1:52-65; Ex. OTH-A at ¶28.)

During the relevant time, industry experts were also interested in continuously variable headlamps:

> Automatic control of continuously variable headlamps offers several potential benefits over automatic control of traditional on-off headlamps. Greater flexibility for illumination is available, allowing headlamp illumination to be better adapted to driving conditions. Also, continuously varying the headlamp illumination does not create rapid changes in illumination that may startle the driver.

(Ex. PA-C at 2:13-19; Ex. OTH-A at ¶29.)

Per the '632 patent, "one of the oldest methods [for a continuously variable headlamp] is to aim the headlamp in the same direction as steered wheels. Another method increases the



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illumination range in proportion to vehicle speed." (Ex. PA-C at 2:22-24; Ex. OTH-A, at ¶30.) "Still another method of controlling headlamps has been developed for HID lamps. The increased brightness and blueish color of the HID lamps is particularly disrupting to oncoming drivers. Due to this disruptness effect, certain European countries require headlamp leveling systems." (Ex. PA-C at 2:25-29; Ex. OTH-A at ¶31.)

In addition to benchmarking the state of automotive lighting development, the specification of the '632 patent identified a persistent deficiency with continuously variable headlamps: "One problem with current continuously variable headlamp control systems is the inability to consider oncoming or leading vehicles in determining the illumination range of the headlamps." (Ex. PA-C at 2:35-38; Ex. OTH-A at ¶32.) Per the '632 patent, prior art solutions to modify illumination in view of oncoming and leading vehicles suffered from several problems. In particular, prior art systems lacked "color discriminating capability" and thus prior art imaging systems were "incapable of accurately determining lateral and elevational locations of headlamps or tail lights at any distance." (Ex. PA-C at 2:54-60; Ex. OTH-A at ¶32.)

To address the above-identified problem, Joseph S. Stam and his colleagues at Gentex Corp filed US 09/800,460 in March, 2001, which issued as U.S. Patent No. 6,587,573 (Ex. PA-D, "Stam '573") in July, 2003. Stam '573 focused on how to improve automatic high beam dimming functionality by improving image detection capability using an image array sensor to 1) distinguish "nuisance" light sources, taillights and oncoming lights to avoid unnecessary switching to low beams; and 2) develop a more intelligent set of automatic high beam controls of halogen/HID light sources based on the location of detected objects. (Ex. PA-D; Ex. OTH-A at ¶33.)

In his declaration, in reference to Stam '573 and its related filings ("'573 Family of Patents"), Stam states that the "patent applications I filed during this time describe detailed



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methods for distinguishing "nuisance" light sources, such as reflectors, street signs, streetlights and house lights, from taillights and oncoming headlight sources using a coordinate-specific image array sensor and microprocessor that employs various algorithms using location, brightness and color information." (Ex. OTH-A at ¶34.) Per Stam, these filings specifically outline image detection control strategies to adjust illumination to avoid glare based on the identification or type of detected objects by 1) turning them on/off or varying the intensity of the light sources and 2) changing the direction of the light sources using motors. (Ex. OTH-A at ¶35.) Exemplary illumination patterns are shown in Figs. 50A-50C of the '573 Patent. (Ex. PA-D Figs. 50A-50C; Ex. OTH-A at ¶35.)

As Stam explains in his declaration, in the '573 Family of Patents, "the auto high beam control teachings contemplated halogen or HID light sources as those technologies were proven and reliable at the time." (Ex. OTH-A at ¶36.) Stam goes on to state that while he was working at Gentex, "high-powered white light LED technology was still in a nascent stage, with LED experts working on improvements to lamp technology and the related supportive environment needed for LED applications." (Ex. OTH-A at ¶36.) "LEDs suffered from several technical constraints at the time, with issues related to product variability, power restrictions, thermal load requirements, production of white light and lighting output." (*Id.*) Stam further provides that "[a]lthough LEDs were known to be more energy efficient, the technology was overly complex, unreliable and too costly for front headlights." (Ex. OTH-A at ¶37.)

Thus, in 2003 and for several years thereafter, "those skilled in the art of auto headlight design and controls used LEDs for taillights and interior spotlights but not front headlights." (*Id.*) By way of example, EP1391347, filed in July, 2003 by HELLA (a global developer and manufacturer of automotive lighting), is directed to a pivoting, auto high-beam lamp devoid of any

teaching of the use of LEDs and U.S. Patent No. 6,752,523 filed in October 2002 by Koito (a global developer and manufacturer of automotive lighting), discloses the use of LEDs for taillights but not headlights. (*Id.*) LED headlights were first used in vehicles in 2007-2008. *See*, Toyota's use of a partial LED headlight in 2007 and Audi's introduction of full LED headlights in 2008. (Ex. 1 Motor Authority; Ex. 2 Audi Technology Portal; Ex. OTH-A at ¶38.) *See*, Koito's development chronology, which lists "Production and sales of the world's first LED Headlamps" in May 2007; HELLA's product history timeline, which lists "HELLA develops the first full LED headlamp for the Cadillac Escalade Platinum" in 2008 and "First full LED headlamp with AFS functions Audi A8" in 2010. (Ex. 5 Koito at 1; Ex. 6 HELLA at 1; Ex. OTH-A at ¶38.)

## V. The Prior Art Asserted References

### A. Stam PCT

Stam PCT (WO 01/70538), filed on March 20, 2001, is part of the '573 Family of Patents. (Ex. PA-A at 1.) Stam PCT is directed to a system for controlling exterior vehicle lights, wherein the control system "comprises an imaging system configured to image the scene forward the controlled vehicle, and a control circuit for processing the image of the scene obtained from the imaging system and for controlling the exterior lights to change their beam pattern in response to objects detected in the processed scene." (Ex. PA-A at 2-3.)

Per Stam PCT, the control circuit can turn the lights on/off or change brightness and aim to produce beam patterns that avoid causing excessive glare:

> Ideally the exterior lights are controlled such that if an observer is located in a vehicle within a 'glare area' relative to the vehicle (i.e., the area in which the observer would perceive the brightness of the exterior lights as causing excessive glare), the beam illumination pattern is varied such that the observer is no longer in the glare area. The perceived brightness and/or glare area of the headlamps (and/or

other exterior lights) may be varied by changing the illumination output of the one or more of the lights forming the headlamps, activating or deactivating some or all of the lights, altering the illumination pattern forward of the vehicle, or a combination of the above.

(Ex. PA-A at 9; Ex. OTH-A at ¶47.)

As Stam explains in his declaration, in reference to the above excerpt, "activating or deactivating 'some or all of the lights' refers to low beam, high beam or side bending lights, which is distinct from any teaching involving individual light emitters within a lamp." (Ex. OTH-A at ¶48.)

As outlined in Stam PCT, the known technical constraints with LEDs in 2001-2002, limited LED usage in headlights:

> It has long been considered to be desirable to provide headlamps that can be steered in the direction that the vehicle is turning. It is also desirable to provide forward lighting that can be turned OFF, or substantially attenuated, for such a short period of time that the driver does not notice that the lights are OFF. In this way, reflections do not exist during image acquisition. Although a light emitting diode (LED) lamp can be used to provide these features in a cost-effective manner, LED lamps producing enough light to implement a vehicle headlamp are not commercially available. LEDs suffer from a number of disadvantages that limit their application in vehicle headlamps, not the least of which are the relatively small amounts of light produced by LEDs and manufacturability limitations when incorporating LEDS having exotic constructions. Because of these disadvantages, LED lamps have not been used to implement a vehicle headlamp despite the fact that LEDs are more rugged, more energy efficient, and significantly longer lasting than other light technologies. Additionally, means of producing white light from LEDS have only recently become practical as discussed in U.S. Patent No. 5,803,579, entitled ILLUMINATOR ASSEMBLY INCORPORATING LIGHT EMITTING DIODES, issued to John K. Roberts et al. on September 8, 1998.



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(Ex. PA-A at 72-73, emphasis added; Ex. OTH-A at ¶50.)

As a result of the technical issues with LEDs in 2001-2002, the Stam PCT disclosure is limited to two LED applications that could be used as a complement to and/or as a substitute for halogen/HID light sources, to address specific imaging challenges and improve auto high beam functionality. (Ex. OTH-A at ¶51.) More specifically, though the Stam PCT teachings are directed to halogen/HID light sources, it discloses two limited uses for LED applications—to address flashing and steering:

> One of these LED applications focuses on the problem of flashing, which occurs when reflections off an object, such as a sign, are misinterpreted by the image sensor as an oncoming vehicle and trigger disruptive, rapid high/low beam flashing (repeatedly turning high beams on and off). As one solution for headlamp flashing, we contemplated the use of LEDS to rapidly reduce the light levels or turn the LEDS off, during an image-sampling interval, so that the reflections do not exist or interfere with image acquisition and processing. If done fast enough, the driver would not notice the change in light levels and the problem of flashing would be rectified. Such rapid reduction of intensity would be difficult or impossible with halogen/HID light sources.

(Ex. PA-A at 73-75; Ex. OTH-A at ¶52.)

The second LED application focused on an improved way to "steer" the light source by replacing the halogen/HID light with an LED array that could be aimed at a fixed angle for auto high beam applications. To facilitate "steering" for auto high beam applications, we disclosed use of an LED array to 1) help provide sufficient output light and 2) project light in more than one either horizontal (*see* Fig. 27) or vertical direction (*see* Fig. 28) by providing a support member with two different angled orientations. In all cases, the LED arrays were connected together and operated by a single controller, such that the entire array would be on/off or dimmed, as shown in

Fig. 26a. (Ex. PA-A at 77-79; Ex. OTH-A at ¶53.)

As the Stam declaration specifically points out, in, Fig. 26a, every optical radiation emitter (LED chip) 2603 is electrically connected together "to electrical conductor strip 2607 through a wire bond 2609 and a resistor 2611. Each of the emitters 2605 is connected to electrical conductor strip 2613 through a bonding wire 2615 and a resistor 2617." (Ex. PA-A at 74; Ex. OTH-A at ¶54.) "Since electrical conductor strips 2607, 2613 are shown to be common to multiple LED chips, they necessarily are not individually controlled or controllable." (Ex. OTH-A at ¶54.)

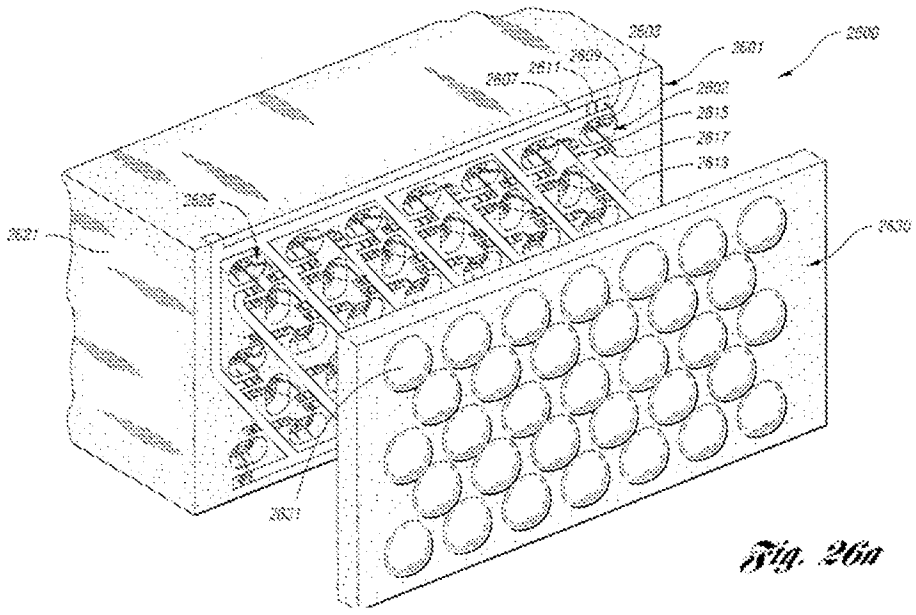


Fig. 26a

The Stam declaration further provides:

> In Figs. 50a-50c, we illustrate the types of illumination beam patterns that can be produced from the disclosed auto high beam applications. In each case, the light source is treated as a fixed block of light—whether halogen/HID or an LED array—that can be 'steered' up/down or right/left by varying the power to the LED array—

treating an array of LEDs as a unit that would be operated together.

(Ex. OTH-A at ¶55.)

Another headlamp configuration is depicted in Fig. 28, in which two LED arrays are provided, for low and high beams, and each array is treated as a single unit to be operated together:

> [a]nother alternative design for a headlamp for providing low and high beams is illustrated in Fig. 28. The headlamp 2800 includes a heat extraction member 2801 having two lamp sections 2803 and 2805. The heat extraction member 2801 is configured to include the two lamp sections 2803 and 2805, each of which is substantially identical to lamp 2601 [in Fig. 26a]. The heat extraction member provides two front faces at an angle of 1° to 2°, and may advantageously be angled at approximately 1.5°. The angle is exaggerated in Fig. 28 so that the angled surfaces are readily visible.

(Ex. PA-A at 79, emphasis added; Ex. OTH-A at ¶56.)

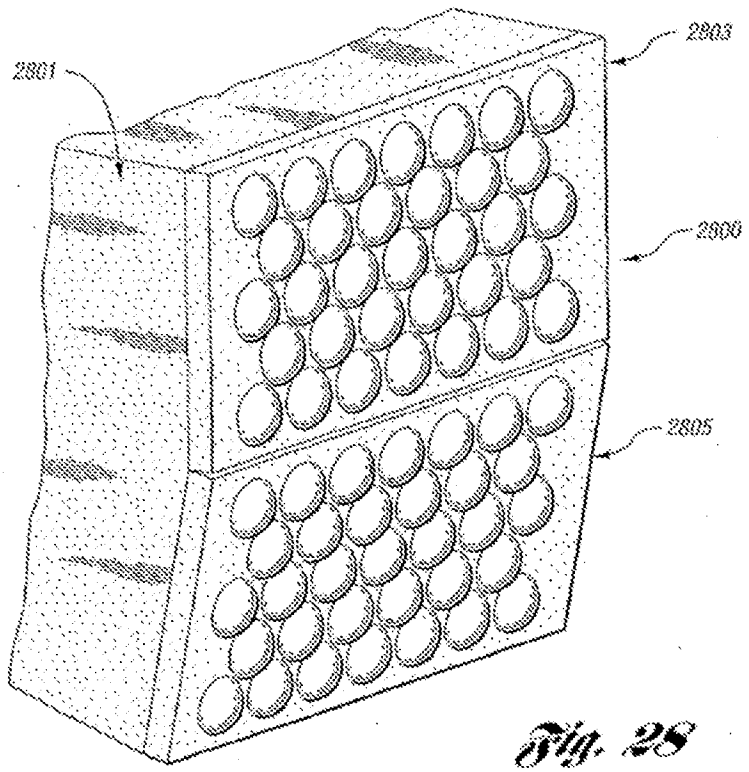



Fig. 28

In reference to Fig. 28 and the two separate LED lamp sections, 2803 and 2805 for high and low beams, the specification states: "[b]y controlling the selection of the LEDs that are illuminated, the headlamps can be aimed." As Stam make clear, "[w]hen read in context this sentence is consistent with the Stam PCT teaching that one or more LED arrays can be controlled as a single unit and in that capacity, the light from the headlamps can be steered and aimed." (Ex. OTH-A at ¶57.)

Stam also highlights the teaching absent in Stam PCT:

> [i]n the '573 Family of Patents and the Stam PCT we did not disclose a digital headlamp that included individually controllable LEDs that could be controlled to illuminate a defined coordinate-specific region. The '573 Family of Patents and Stam PCT did not teach or suggest controlling the individual LED or a selectable

group of LEDs within the array based on image detection at a given coordinate-specific location.

(Ex. OTH-A at ¶58.)

In his declaration, Stam explains how Stam PCT treated light and the resulting impact:

> While the '573 Family of Patents and Stam PCT disclosed an improved continuously variable lighting system that could adjust the intensity of the high beams and aim the headlamp beam to avoid glaring an oncoming and/or preceding vehicle, in all cases, light was treated as a fixed block to be moved or adjusted in a particular direction. As a result, the presence of one or more oncoming or preceding vehicles, would cause a driver's field of view to be lit primarily by the low beam lighting.

(Ex. OTH-A at ¶59.)

The Stam declaration also provides clarity on the use of GPS or map data in Stam PCT: Additionally, neither Stam PCT nor the '573 Family of Patents disclose use of a GPS or map data to generate coordinate-specific illumination patterns in response to upcoming road curvatures. In his declaration, Stam states:

> I mention use of GPS embodiments to determine the location of the vehicle and whether the vehicle is on a residential, country or town street, to determine whether "super" high beams were appropriate. I also disclose "bending lights" in which the light source aim is varied horizontally or separate lamps are lit to provide better illumination when turning. As with the other embodiments, I viewed each individual light source or an LED array as a single light source unit. I did not disclose individual control of the LEDs within an array into individually controlled elements or clusters. As such, I did not disclose using image detection in combination with GPS and map data to generate illumination patterns formed by individual LEDs or selectable clusters of LEDs within an array in response to

upcoming road curvatures.

(Ex. OTH-A at ¶60.)

Finally, Stam makes it clear that

> [i]t was not until US Patent No. 6,861,809 which was filed on September 5, 2002 and published on June 12, 2003 that we first described the use of individually controllable LEDs where a portion of the LEDs within an array could be dimmed or turned off to avoid glaring an oncoming vehicle.

(Ex. PA-E, Stam '809 patent; Ex. OTH-A at ¶61.)

*See* Fig. 7b and the accompanying description: "[a]lternatively, the window 700 may contain several independently controlled blocks 702 as shown in Fig. 7B. There may be any number of blocks, depending on the granularity of control that is desired. By selectively darkening these blocks, almost any desired beam pattern can be achieved." (Ex. PA-E at 13:6-14:3, emphasis added; Ex. OTH-A at ¶61.)

As laid out in the Stam declaration: "no other companies were offering LED headlamp technology let alone contemplating this sort of LED-to-image correlation in 2003. Given the nascent state of LED technology, those in the field of automotive lighting, were not contemplating such LED applications at the time." (Ex. OTH-A at ¶62.)

This is further evidenced by the development chronology outlined in the websites of two leading global headlamp suppliers, Koito and HELLA. (Ex. OTH-A at ¶61.) It wasn't until 2007 that the first LED headlamps were produced by Koito, and fully adaptive LED headlamps were not developed until 2010 by HELLA. (*Id.*) *See*, Koito's development chronology, which lists "Production and sales of the world's first LED Headlamps" in May 2007; Hella's product history timeline, which lists "HELLA develops the first full LED headlamp for the Cadillac Escalade



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