US009781779B2

(12) **United States Patent**
Vinther et al.

(10) **Patent No.: US 9,781,779 B2**
(45) **Date of Patent: *Oct. 3, 2017**

(54) **LED LIGHT FIXTURE WITH BACKGROUND LIGHTING**

(71) Applicant: **Martin Professional ApS**, Aarhus N (DK)

(72) Inventors: **Thomas Vinther**, Beder (DK); **Claus Hansen**, Hornslet (DK)

(73) Assignee: **Martin Professional ApS**, Aarhus N. (DK)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 704 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/676,243**

(22) Filed: **Nov. 14, 2012**

(65) **Prior Publication Data**

US 2013/0093360 A1 Apr. 18, 2013

Related U.S. Application Data

(63) Continuation of application No. 13/321,288, filed as application No. PCT/DK2011/050110 on Apr. 5, 2011, now Pat. No. 8,482,226.

(30) **Foreign Application Priority Data**

Apr. 23, 2010 (DK) 2010 00361

(51) **Int. Cl.**
H05B 39/04 (2006.01)
H05B 33/08 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H05B 33/0803*** (2013.01); ***F21S 10/023*** (2013.01); ***H05B 33/0857*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC . G09G 3/06; F21Y 2101/00; F21Y 2113/007; F21Y 2105/003; F21V 3/049; F21V 14/065
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,803,579 A * 9/1998 Turnbull B60L 1/14 257/E25.02
5,816,681 A * 10/1998 Tedesco F21S 48/215 362/293
(Continued)

FOREIGN PATENT DOCUMENTS

EP 1344684 9/2003
GB 818164 8/1959
(Continued)

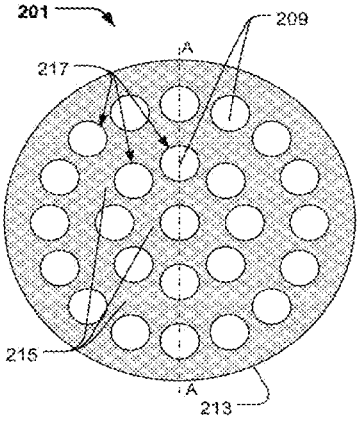
OTHER PUBLICATIONS

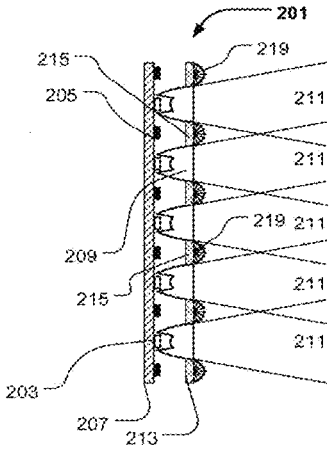
First Office Action; Japanese Application No. 2013-505332, Filing Date: Apr. 10, 2013; 4 pages.
(Continued)

Primary Examiner — Don Le
(74) *Attorney, Agent, or Firm* — Blank Rome LLP

(57) **ABSTRACT**

An illumination device with a number of light sources arranged in at least two groups of light sources that are individually controllable. The first group of light sources (**203**) have light collectors (**209**) such as internal reflection (TIR) lenses, mixers or other lenses placed over them to collect and convert light of the light sources into a number of light source beams. The second group of light sources (**205**) pass light through diffusing areas (**215**) of a diffuser (**213**) in the form of a diffusion cover included in the lamp housing to diffuse the light and create a background light for the first group of light sources. The light from the first group of light sources pass through non diffusing regions (**211**) of the diffuser cover without the light being diffused. The
(Continued)





second group of light sources are interleaved with the first group by the diffuser having one or several diffusion areas between non diffusion areas. By controlling both groups of light sources based on the same target color the dotted look of led light sources can be removed or by controlling the two groups of light sources based on two different colors light effects can be obtained. The illumination device can be included in a moving head light source with a base, a yoke connected rotatably to the base and the head connected rotatably to the head.

11 Claims, 8 Drawing Sheets

(51) **Int. Cl.**

F21S 10/02	(2006.01)
F21V 7/00	(2006.01)
F21V 21/30	(2006.01)
F21W 131/406	(2006.01)
G02B 5/02	(2006.01)
G02B 26/08	(2006.01)
F21V 5/00	(2015.01)
F21V 29/67	(2015.01)
F21V 29/74	(2015.01)
F21Y 105/12	(2016.01)
F21Y 105/10	(2016.01)
F21Y 115/10	(2016.01)
F21Y 113/13	(2016.01)
F21Y 113/20	(2016.01)

(52) **U.S. Cl.**

CPC *F21V 5/007* (2013.01); *F21V 7/0083* (2013.01); *F21V 21/30* (2013.01); *F21V 29/677* (2015.01); *F21V 29/74* (2015.01); *F21W 2131/406* (2013.01); *F21Y 2105/10* (2016.08); *F21Y 2105/12* (2016.08); *F21Y 2113/13* (2016.08); *F21Y 2113/20* (2016.08); *F21Y 2115/10* (2016.08); *G02B 5/0278* (2013.01); *G02B 26/08* (2013.01)

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,016,038	A *	1/2000	Mueller	H05B 33/0857 315/291
6,166,496	A *	12/2000	Lys	H05B 33/0857 315/292
7,015,825	B2 *	3/2006	Callahan	G09F 9/33 340/815.45
7,077,525	B2 *	7/2006	Fischer	F21L 4/00 353/101
7,163,317	B2 *	1/2007	Warnecke	F21S 10/02 362/230
7,327,337	B2 *	2/2008	Callahan	G09F 9/33 340/4.3
7,358,929	B2 *	4/2008	Mueller	E04F 13/08 345/1.1
7,995,014	B2	8/2011	Lin et al.	
2003/0076281	A1 *	4/2003	Morgan	F24C 7/004 345/44
2003/0174293	A1 *	9/2003	Hubel	G02F 1/133514 353/84
2003/0231489	A1 *	12/2003	Hsiao	362/106
2004/0095757	A1 *	5/2004	Hsien	F21L 4/02 362/202
2005/0007767	A1 *	1/2005	Fischer	F21L 4/00 362/157
2005/0116667	A1 *	6/2005	Mueller	E04F 13/08 315/312
2007/0019415	A1 *	1/2007	Leblanc et al.	362/299
2007/0047254	A1 *	3/2007	Schardt	G02B 5/0242 362/607
2007/0189010	A1	8/2007	Arai	
2007/0268700	A1 *	11/2007	Hough	F21S 10/02 362/268
2008/0025047	A1 *	1/2008	Speier	F21K 9/00 362/613
2008/0101064	A1 *	5/2008	Draganov et al.	362/231
2008/0123057	A1 *	5/2008	Williamson	F21V 7/0091 353/30
2008/0197783	A1 *	8/2008	Chen	315/153
2009/0196627	A1 *	8/2009	Rasmussen	H05B 37/029 398/182
2009/0230892	A1 *	9/2009	Vinter	H05B 41/2928 315/309
2009/0231850	A1 *	9/2009	Rasmussen	F21V 21/15 362/253
2009/0231852	A1 *	9/2009	Vinter	362/276
2010/0079059	A1 *	4/2010	Roberts	F21K 9/00 313/503
2010/0091491	A1 *	4/2010	Jiang et al.	362/235
2010/0296279	A1 *	11/2010	Ko	362/231
2011/0096548	A1 *	4/2011	Pickard	362/294
2011/0182065	A1 *	7/2011	Negley	F21K 9/00 362/231
2012/0170602	A1 *	7/2012	Hikmet et al.	372/31
2014/0160755	A1 *	6/2014	Dureiko	362/240

FOREIGN PATENT DOCUMENTS

JP	2005017576	1/2005
JP	2005317348	11/2005
JP	2006319149	11/2006
JP	2009009809	1/2009
JP	2009158168	7/2009
JP	2009266818	11/2009
JP	2010050060	3/2010
WO	WO2009081382	7/2009

OTHER PUBLICATIONS

English translation of First Office Action; Japanese Application No. 2013-505332; 4 pages.
English abstract; Japanese Application No. 2005-501576; 1 page.
English abstract; Japanese Application No. 2006-319149; 1 page.
English abstract; Japanese Application No. 2009-009809; 1 page.
English abstract; Japanese Application No. 2009-158168; 2 pages.
English abstract; Japanese Application No. 2009-266818; 2 pages.
Written Opinion; International Application No. PCT/DK2011/050110; International Filing Date: Apr. 15, 2011; 5 pages.
International Search Report; International Application No. PCT/DK2011/050110; International Filing Date: Apr. 15, 2011; 4 pages.
English translation; European Application No. EP1344684; 7 pages.
English abstract; Japanese Application No. 2005-317348; 1 page.
English abstract; Japanese Application No. 2010-050060; 1 page.

* cited by examiner

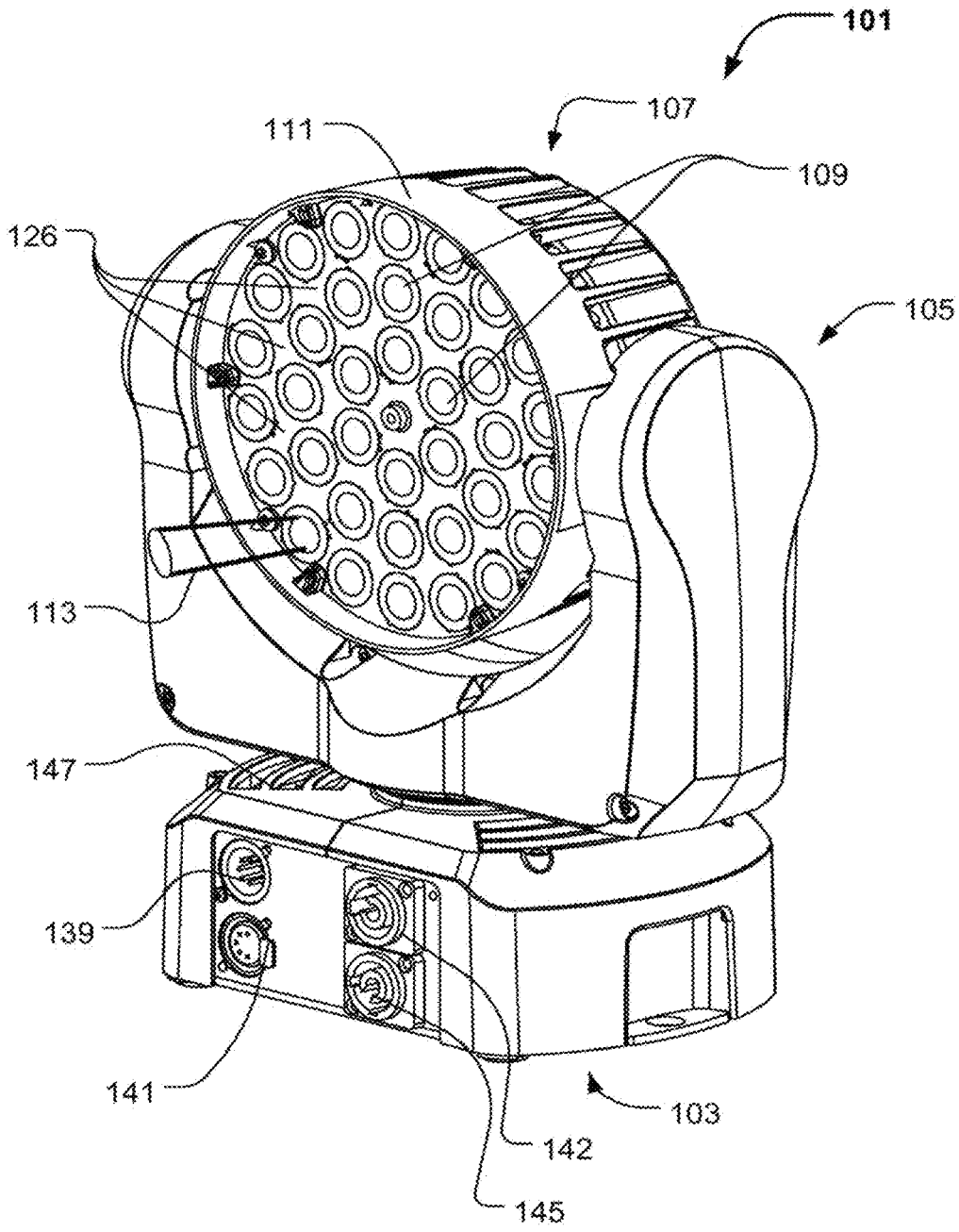


Fig. 1a (Prior art)

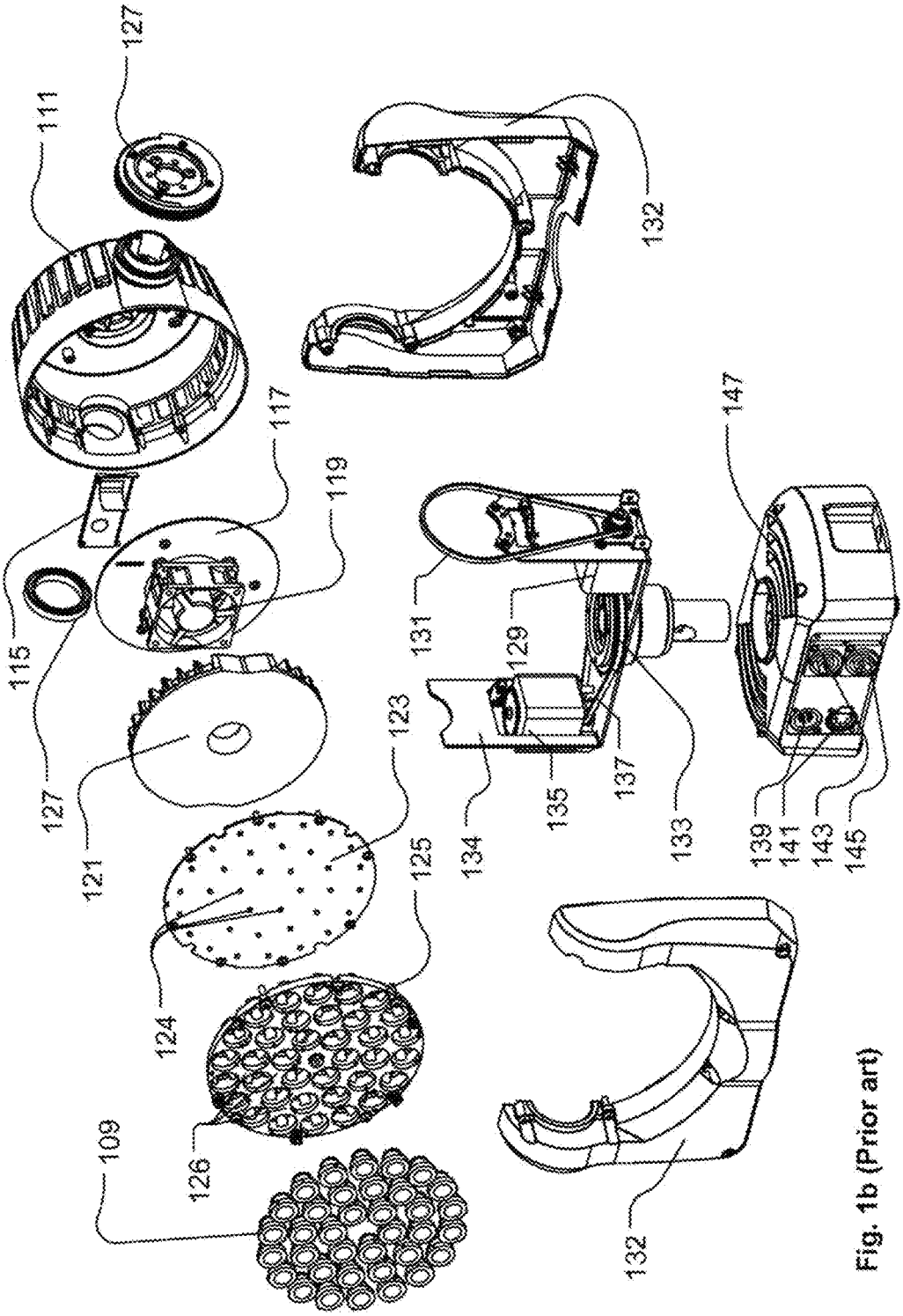


Fig. 1b (Prior art)

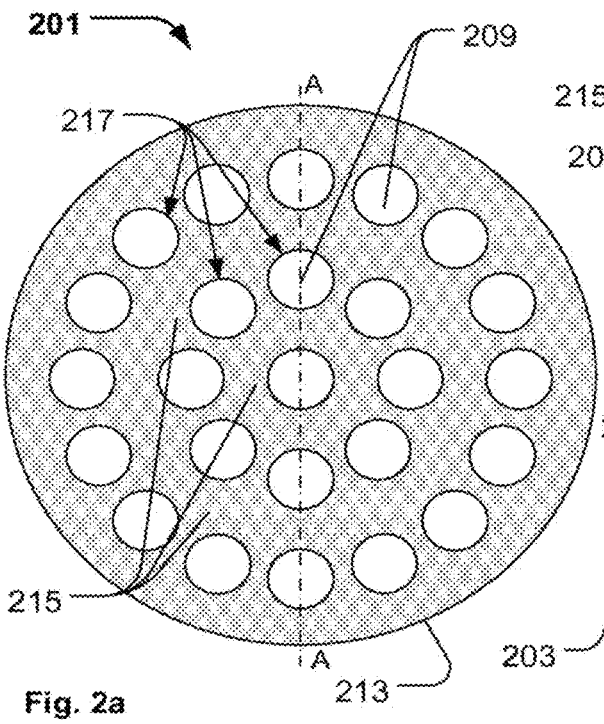


Fig. 2a

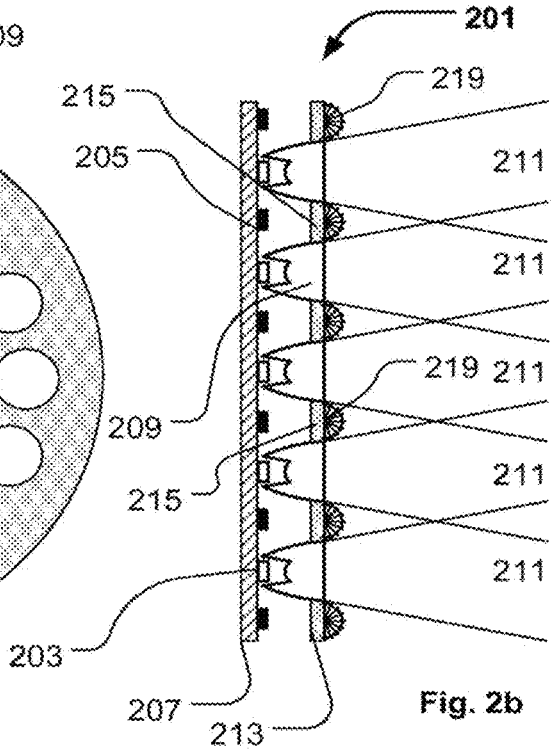


Fig. 2b

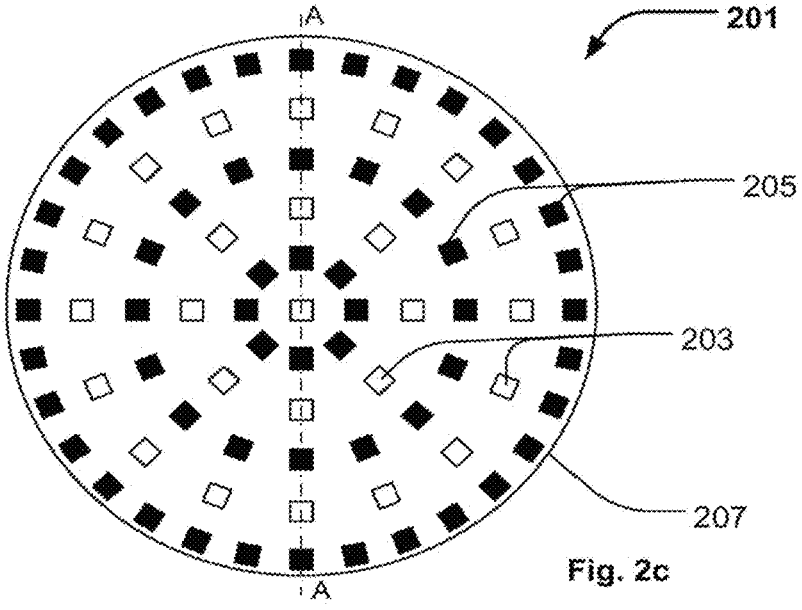


Fig. 2c

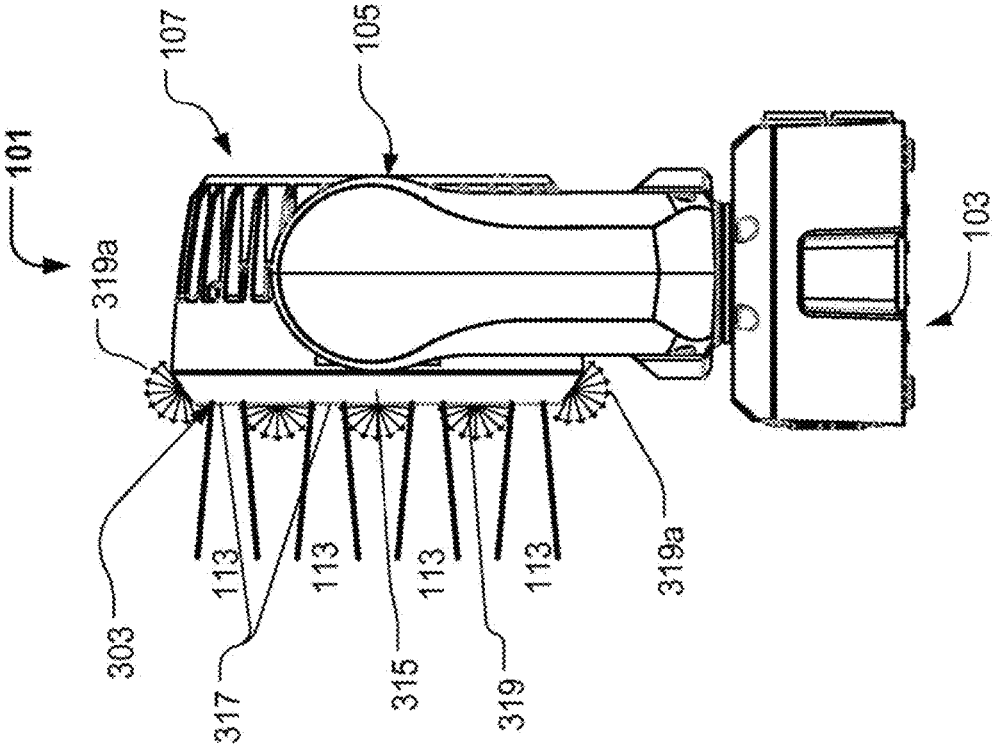

101
107
105
319a
103
303
113
113
113
113
319a
317
315
319

Fig. 3b

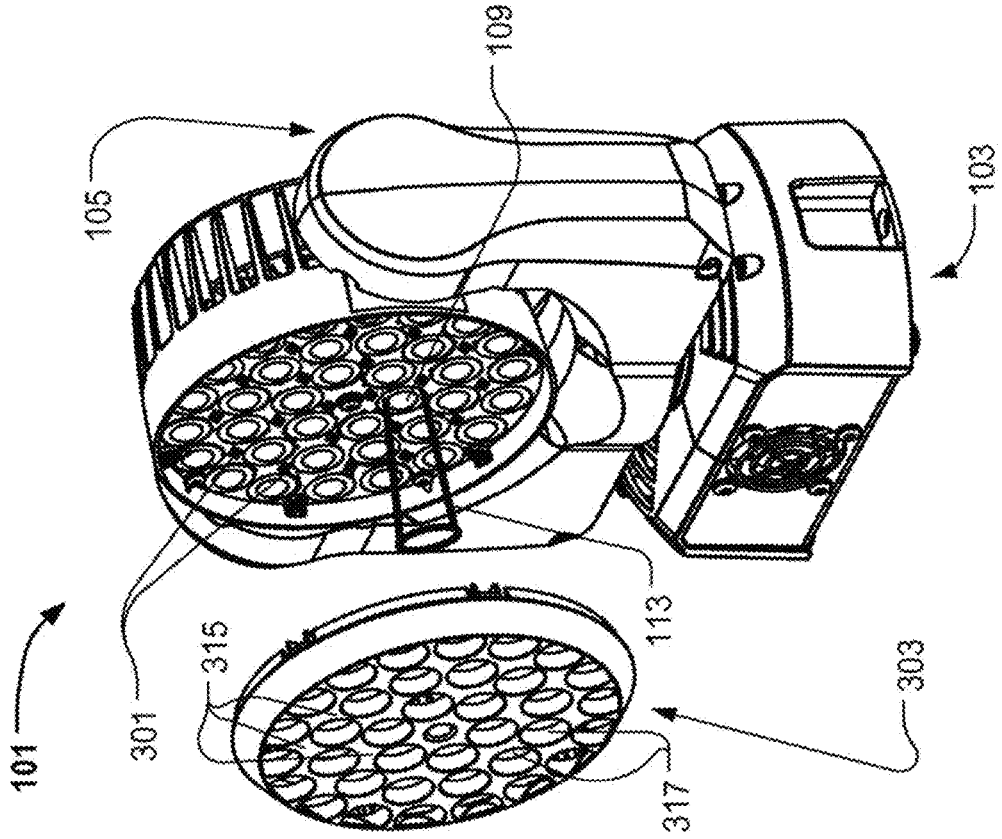

109
105
103
101
301
315
113
303
317

Fig. 3a

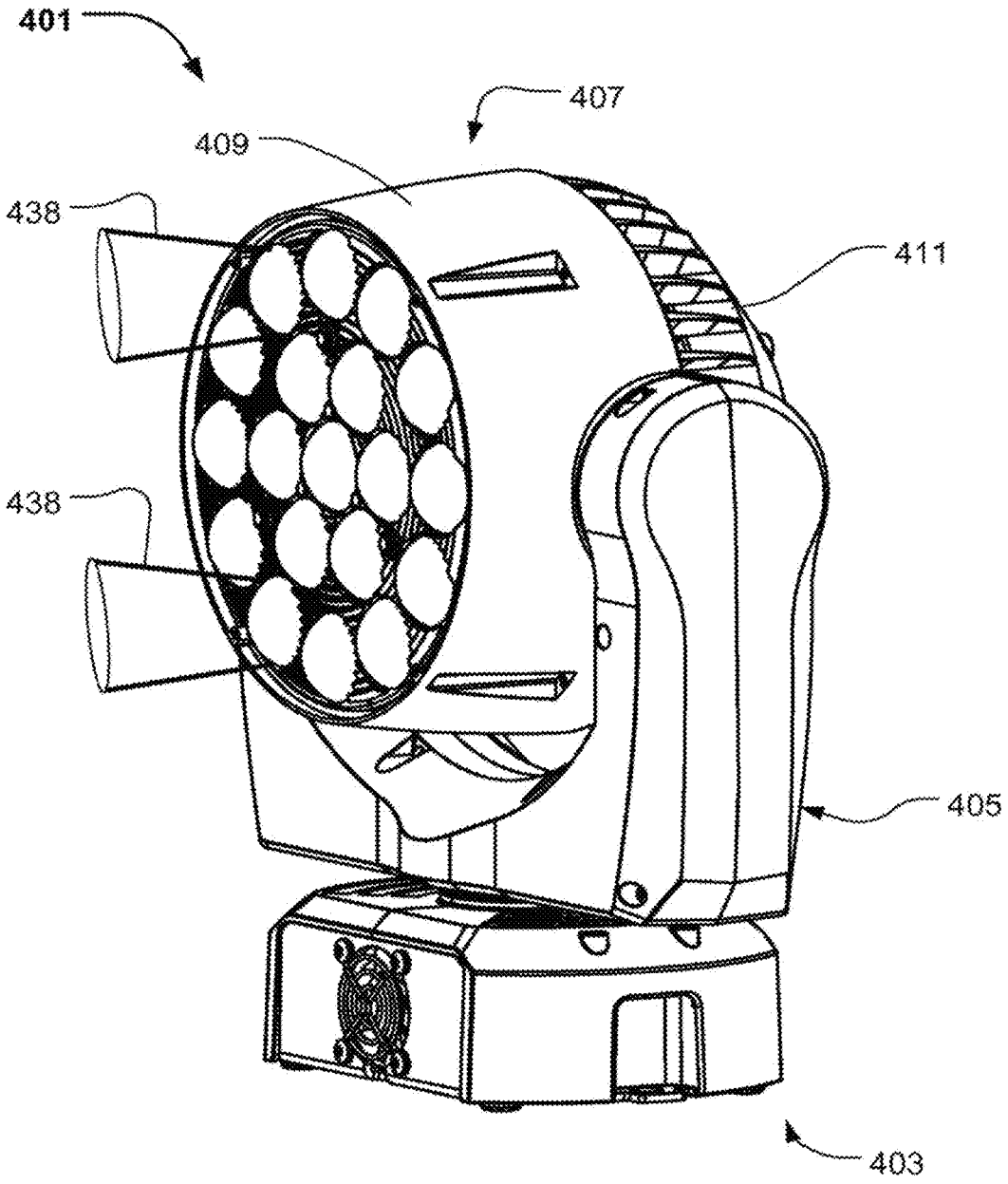


Fig. 4a

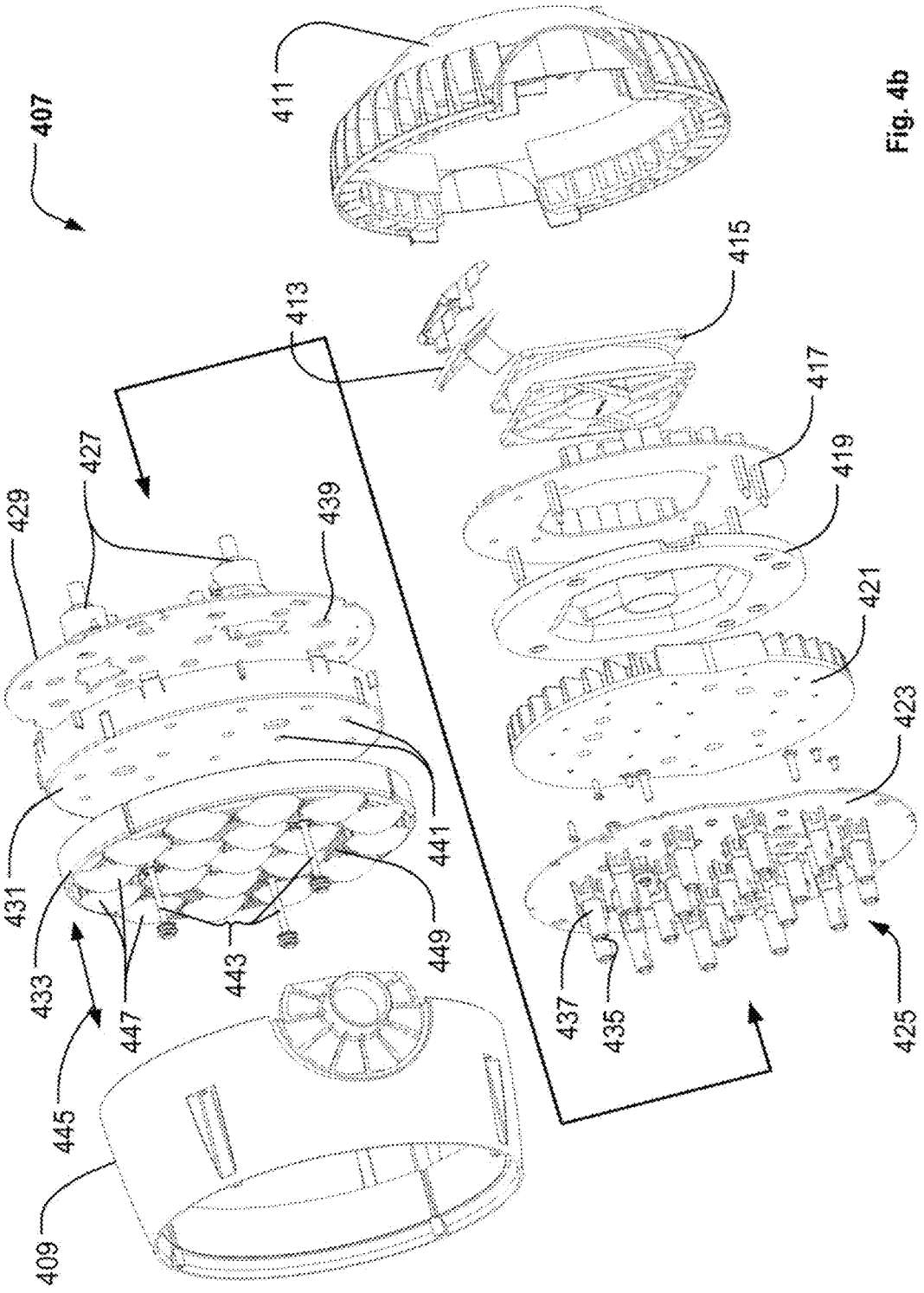

407
411
415
413
417
427
419
429
439
421
431
441
423
433
449
443
437
435
447
425
445
409

Fig. 4b

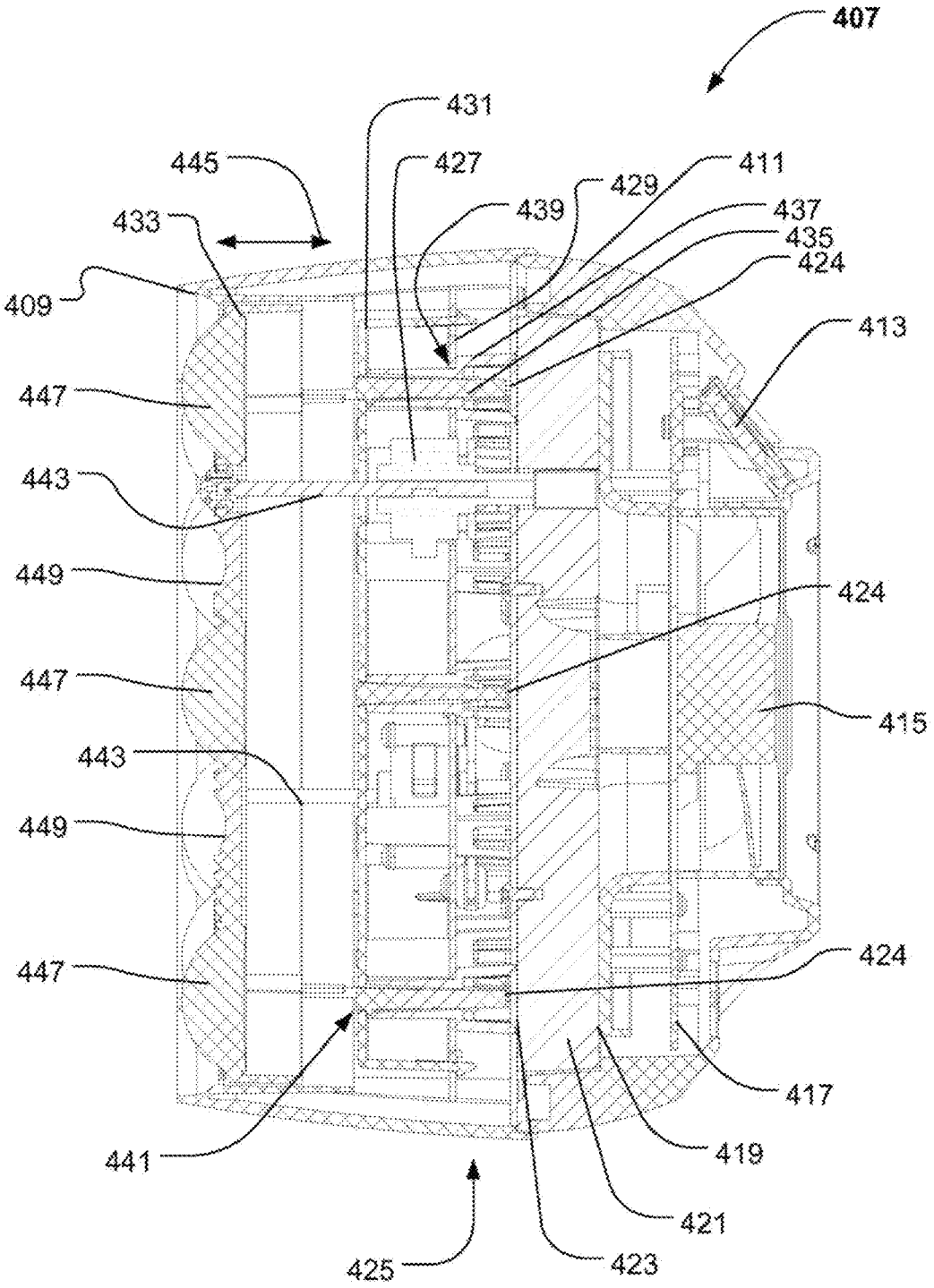

407
431
445
427
411
429
439
437
433
435
424
409
413
447
443
449
424
447
415
443
449
447
424
417
419
441
421
425
423

Fig. 4c

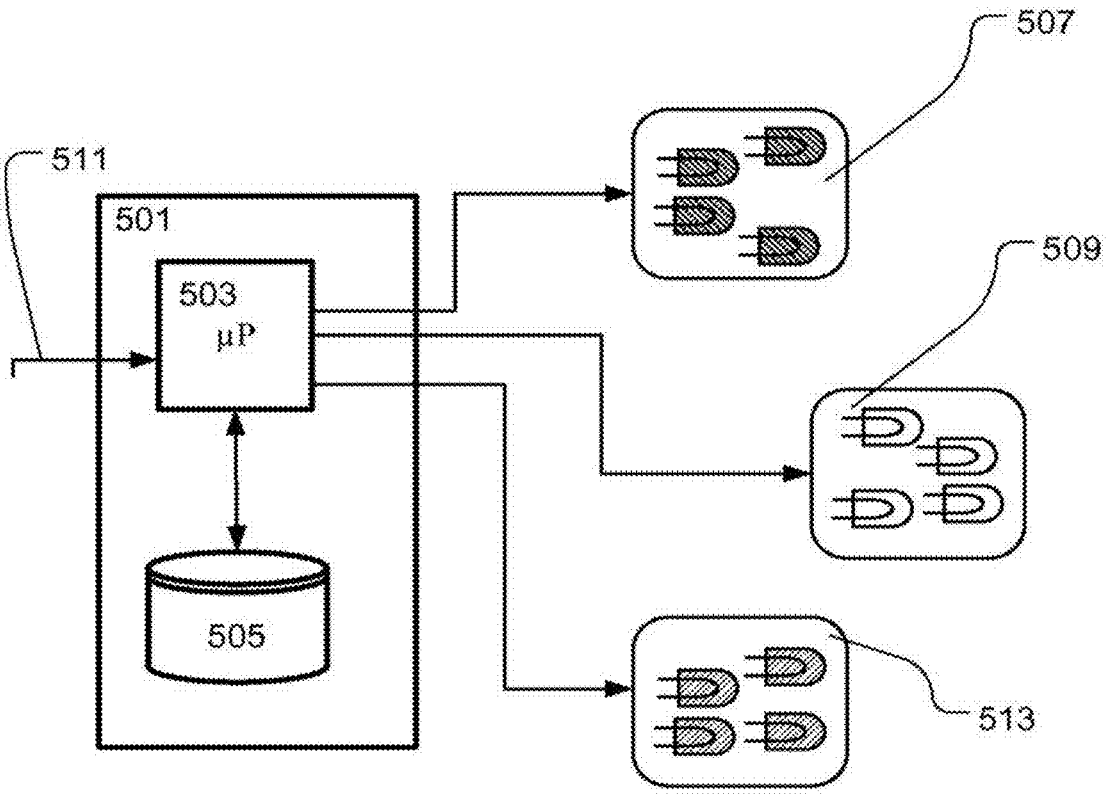


Fig. 5

LED LIGHT FIXTURE WITH BACKGROUND LIGHTING

CROSS REFERENCE TO RELATED APPLICATIONS

This application is a continuation of U.S. application Ser. No. 13/321,288, filed Dec. 14, 2011 (now U.S. Pat. No. 8,482,226); which application is a U.S. national phase application of International Patent Application No. PCT/DK2011/050110, filed on Apr. 5, 2011; which application claims benefit of priority of Danish Patent Application No. PA 2010 00361, filed on Apr. 23, 2010 (now Denmark Patent DK 177579). The above-identified related applications are incorporated herein by reference in their entirety.

FIELD OF THE INVENTION

The present invention relates to an illumination device comprising a number of light sources and a number of light collecting means arranged in a housing. The number of light collecting means collect light from at least one of the light sources and convert the collected into a number of source light beams and the light source beams are emitted from said housing.

BACKGROUND OF THE INVENTION

Light fixtures creating various effects are getting more and more used in the entertainment industry in order to create various light effects and mood lighting in connection with live shows, TV shows, sport events or as a part on architectural installation.

Entertainment light fixtures creates typically a light beam having a beam width and a divergence and can for instance be wash/flood fixtures creating a relatively wide light beam with a uniform light distribution or it can be profile fixtures adapted to project an image onto a target surface. There is a tendency that more and more of this kind of fixtures are used in each show or each installation and the fixtures get as a consequence more and more visible for the sectors or TV viewers. The light fixtures typically create the lighting effect at a distance from the light fixture itself and the light fixture is thus not as interesting and esthetic to look at. The fixture manufactures tries as a consequence to provide the fixtures with esthetic designs in order to make the fixture more interesting to look at. However this is very difficult as the housing of the fixtures typical dependents on physical requirements defined by the technical specifications of the fixture such as optics, mechanics, electronics, cooling etc.

The LED component has further as a light source changed the look of most lighting luminaries, when using multiple LEDS to replace a single light source. This implies for all lighting industries—general, domestic, industrial, entertainment, etc. The most visible change is that all multiple light sources are now exposed to the viewer and the light emits from a larger area. Now that most LED fixtures have visible LEDs, some customers dislike the look of multiple light dots. Instead a more uniform, even light exit is requested, to avoid the cheap looking "funfair" look with an extreme amount of light sources. The dotted "funfair" look appears both on light fixtures which mixes the colors before the light is emitted from the housing and also of light fixtures where the colors are mixed in the air or at the wall.

DESCRIPTION OF THE INVENTION

The object of the present invention is to solve the above described limitations related to the prior art. This is achieved by an illumination device and method as described in the independent claims. The dependent claims describe possible embodiments of the present invention. The advantages and benefits of the present invention are described in the detailed description of the invention.

DESCRIPTION OF THE DRAWINGS

FIGS. **1***a* and **1***b* illustrate an example of a moving head lighting fixture according to prior art;

FIG. **2***a*-**2***c* illustrate an embodiment of an illumination device according to the present invention;

FIG. **3***a*-**3***b* illustrate the illumination device of FIG. **1***a*-**1***b* modified into an illumination device according to the present invention;

FIG. **4***a*-**4***c* illustrate another embodiment of an illumination device according to the present invention;

FIG. **5** illustrates a block diagram of an illumination device according to the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is described in view of a moving head lighting fixture including a number of LEDs that generate a light beam, however the person skilled in the art realizes that the present invention relates to illumination devices using any kind of light source such as discharge lamps, OLEDs, plasma sources, halogen sources, fluorescent light sources, etc. and/or combinations thereof. It is to be understood that the illustrated embodiments are simplified and illustrate the principles of the present invention rather than showing an exact embodiment. The skilled person will thus understand that the present invention can be embodied in many different ways and also comprise further components in addition to the shown components.

FIG. **1***a*-**1***b* illustrate an illumination device according to prior art, where FIG. **1***a* is a perspective view and FIG. **1***b* is an exploded view. The illumination device is a moving head lighting fixture **101** comprising a base **103**, a yoke **105** rotatable connected to the base and a head rotatable connected **107** to the yoke.

In the illustrated embodiment, the head comprises a number of light sources and a number of light collecting means **109** arranged in the head housing **111**. The light collecting means collect light from at the light sources and convert the collected light into a number of source light beams **113** (only one illustrated), and which are emitted from the housing.

In the illustrated embodiment the head housing **107** is a "bucket" shaped head housing **111** wherein a display **115** (visible from the rear side of the head), main PCB **117** (Printed Circuit Board), a fan **119**, a heat sink **121**, and LED PCB **123**, and lens assembly are stacked. The LED PCB **123** comprises a number LEDs **124** and the lens assembly comprises a lens holder **125** and a lens array where the lenses constitute the light collecting means **109**. Each light collecting means is adapted to collect light from each LED and convert the collect light into a number of light source beams **113**. The head is rotatable connected to the yoke by two tilt bearings **127**, which are supported by the yoke **105**. A tilt motor **129** is adapted to rotate the head through a tilt belt **131** connected to one of the tilt bearings **127**. The yoke comprises two interlocked yoke shell parts **132** which are mounted to a yoke frame **134** where on the tilt bearings, tilt motor, pan motor and pan bearing are arranged. The LED PCB **123** comprises a number of LEDs emitting light and

which in cooperation with the light collecting means **109** in the lens array generate a number of light source beams. The main PCB comprises controlling circuits and driving circuits (not shown) for controlling the LEDs as know in the art of illumination devices. The main PCB comprises further a number of switches (not shown) which extend through a number of holes in the head housing **111**. The switches and display act as a user interface allowing a user to communicate with the moving head lighting fixture.

The yoke are connected to a pan bearing **133** rotatable connected to the base **103**. A pan motor **135** is adapted to rotate the yoke through a pan belt **137** connected to the pan bearing **133**. The base comprises 5-Pin XLR male **139** and female **141** connectors for DMX signals as known in the art of entertainment lighting; input **143** and output power **145** connectors, power supply PCB's (not shown) and fan (not shown). The fan forces air into the base through vent holes **147**.

This prior art illumination device uses multiple LEDs to replace a single light source as known prior the introduction of the LED component as a widely used light source. However, such illumination device changes its visible appearance as the multiple light sources are now exposed to the viewer and the light emits from a larger area. If the light luminaries are a color mixing version with single color LEDs, then all LED colors used are visible. However some customers dislike the look of multiple light dots. Instead a more uniform, even light exit is requested, to avoid the cheap looking "funfair" look with an extreme amount of light sources.

The illuminating device illustrated in FIGS. **1***a* and **1***b* is just one example of a prior art illumination derive and the skilled person realize that a large number of different embodiments provided by a large number of manufacture exits.

FIGS. **2***a-c* illustrate a simplified embodiment of the illumination device **201** according to the present invention. FIG. **2***a* illustrate a top view, FIG. **2***b* illustrates a cross sectional view along line A-A and FIG. **2***c* illustrates a top view with the diffuser cover removed.

The illumination device **201** comprises a number of light sources arranged in a first group of light sources **203** (indicated as white quadrangles) and in a second group of light sources **205** (indicated as black quadrangles). The light sources are mounted on a PCB **207** (printed circuit board) and the two groups of light sources can be controlled individually for instance by a controller (not shown) as known in the art of lighting. The controller is thus adapted to treat the two groups of light sources as at least two individual light sources which can be individually controlled. However the skilled person realizes that the illumination device also can be adapted to divide each group of light sources into a number of sub-groups which also can be controlled individually and that it is also possible to control each single light source individually. A number of light collecting means **209** are arrange above and around the first group light sources **203** and is adapted to collect light from the first group of light sources and convert the collected light into a number of source light beams **211**. The light collecting means **209** can be embodied as any optical component capable of collecting light from the light sources and convert the light into light beams and can for instance be optical lenses, light mixers, TIR lenses, etc. In the illustrated embodiment the light collecting means **209** are embodied as TIR lenses as known in the prior art and the skilled person realizes that the TIR lens can be designed according to the light output of the light sources and the described optical properties of the source light beam **211**. The light beams **211** will merge into one large light beams as the distance to the illumination device increases.

The illumination device comprises a diffuser cover **213** arranged above the PCB **207** and the diffuser cover comprises at least one diffuser region **215** and at least one non-diffusing region **217**. The diffuser regions receive **215** light generated by the second group of light sources **203** and diffuse the received light in many directions as illustrated by arrows **219**. The consequence is that a new light effect can be created as the area between the light beams can have another color emitted by the second group of light sources. This look can be dynamic if first group of light sources and the second group of light sources are individually controlled as known in the art of entertainment lighting. The second group of light sources can also be adapted to emit light having substantially the same color as the light emitted by the first group whereby the surface of the illumination device appears as one surface having the same color. The diffusing regions can be arranged between the non-diffusing regions whereby the dotted look can be avoided as the areas between the non-diffusing regions now have substantially the same color as the light beams **211** exiting the illumination device through the non-diffusing regions.

The second group of light sources can function as background lighting with own DMX control and both color and intensity can be varied independently of the first group of light sources. They can also be intensity and color linked with first target color in a predetermined manner or has separate control for contrast colors or other intensity. This adjustment/control of the light sources can be done remotely from a central control unit or at the fixture itself.

The present invention can for instance be integrated into the prior art illumination device illustrated in FIG. **1***a*-**1***b* by arranging the second group of light sources between the original LEDs **124** at the LED PCB **123** and letting the light from these light sources be diffused by areas **126** of the lens holder **125** which are positioned between the lens holders **125**.

FIG. **3***a* and FIG. **3***b* is respectively a perspective view and a side view of the illumination device of FIG. **1***a*-**1***b* which has been modified into an illumination device according to the present invention.

In this embodiment a number LEDs **301** (illustrated as black quadrangles) have been mounted at the lens holder **125** between the light collecting means **109**. This can for instance e achieved by embodying the lens holder as a PCB with a number of holes wherein the light collecting means can be arranged or by adding a PCB to the original lens holder. The original LEDs **124** (see FIG. **1***b*) and the added LEDs **301** and are adapted to function as respectively a first group and a second group of light sources that can be controlled individually.

Further the head housing comprises a diffuser cover **303** (exploded from the housing in FIG. **3***a* and mounted in FIG. **3***b*) comprising at least one diffuser region **315** and at least on non-diffusing region **317**. The diffuser regions **317** receive at least a part of the light generated by the second group light sources and diffuses the received light as indicated by arrows **319** (only indicated on FIG. **1***b* for the sake of simplicity). At least at part of the number of source light beams **113** pass through the non-diffusing regions **315** without being diffused. It is to be noted that only some of the light source beams are illustrated for the sake of simplicity. The result is that the dotted LED front look is removed, by lighting up the diffuser cover as light is emitted from both the non-diffusing regions and diffusing regions and the areas

between the lenses are illuminated with the existing internal stray light from the LEDs are diffused into the surroundings.

At least a part of the diffuser cover **303** protrudes from the housing and a part of the light is as a consequence diffused sideways and backwards (as indicated by arrows **319***a*) in relation to the source light beams. The diffusing regions of the diffuser cover can be lit up both from behind the surface and from the side and thereby function as a light guide. The light fixture can as a consequence be viewed from multiple angles and the protruding diffuser cover provides a new light effect to the light fixture.

The non-diffusing regions can be embodied as clear areas like plane transparent surfaces arranged above the light collecting means. Such clear plane transparent surfaces will allow the light source beams to pass without diffusing the light source beams. However the clear areas can be adapted to adjust the beam divergence of the light source light beam but the outgoing light beam will still be a well defined light beam. The diffuser cover can thus be embodies in clear polymer where the diffusing regions are created by etching the surface of the diffuser cover. The diffusing region can also be created by coating the regions where the diffusing region is to be positioned. The diffusing cover can further be molded where the moulds are adapted to define the non diffusing regions and the diffusing regions. The non diffusing regions can also be embodied as aperture or cut outs arranged above said light collecting means.

The diffuser cover can also comprise fastening means which enables a user to attach a diffuser cover to an illuminating device. The diffuser cover can thus be provided as a standard component or as an optional accessory.

FIG. **4***a*-**4***c* illustrates another embodiment of an illumination device accordion the present invention; where FIG. **4***a* is a perspective view, FIG. **4***b* is an exploded view of the head and FIG. **4***c* is a cross sectional view of the head. The illumination device is a moving head light fixture **401** comprising a base **403**, a yoke **405** rotatable connected to the base and a head **407** rotatable connected to the yoke.

In the illustrated embodiment the head **407** comprises a front housing **409** and a rear housing **411** that are interconnected and constitutes the head housing. The following components are arranged inside the head housing:

a display **413** (visible from the rear side of the head)
a fan **415**
a main PCB **417**
an air guide **419**
a heat sink **421**
a first LED PCB **423**
a light collecting assembly **425**
a number of zoom motors **427**
a second LED PCB **429**
a diffusing cover **431**
a zoom lens **433**

The fan is adapted to blow air from the rear side of the housing through the main PCB **413** and the air guide **419**. The air guide is adapted to guide the blown air to the center part of the heat sink **421** where after the air escapes the housing in a radial direction. As a consequence heat can be dissipated away from the first LED PCB **423**. The first LED PCB **423** comprises a number of first type LEDs **424** (only shown in FIG. **4***c*) arranged in a first group of LEDs. The light collecting assembly **425** comprises a number of light collecting means **435** arranged in holding means **437** and holding means **437** is adapted to position each light collecting means above one of the first type LEDs. In this embodiment the first type LEDs are 4 in 1 RGBW LEDs which comprises a red dye, green dye, blue dye and a white dye and each light collecting means is adapted to collect and mix the light from the first type LEDs and convert the collected light into a light beam. A number of light beams **438** (only shown in FIG. **4***a*) will thus be created by the first type LEDs and light collectors. The light collectors can for instance be embodied as described in the pending patent application DK PA 2010 70580 filed by the applicant and incorporated herein by reference.

The second LED PCB **429** is arranged above the first LED PCB **423** at the lower part of the holding means **437**. The LED PCB comprises a number of a second type of LEDs (not shown) and a number of holes **439** where through the light collecting means **435** and the upper part of the holding means **437** can pass. In this embodiment the second type LEDs are 4 in 1 RGBW LEDs which comprises a red dye, green dye, blue dye and a white dye. Compared to the first type of LEDs the second type of LEDs is low power LEDs and requires as a consequence less cooling. However the skilled person that it will realize that it is possible to let the second type LED be the identical to the first type of LEDs.

The diffusing cover **431** is arranged above the second LED PCB **429** and comprises a number of non-diffusing regions embodied as holes **441** wherein the top of the light collection means **435** are arranged and the light beams generated by the first type LEDs will thus pass through the diffusing cover without being diffused. In contrast hereto the light from the second type LEDs will hit the diffusing cover **431** and be diffused and as a consequence the diffusing cover **431** appears as one illuminating surface.

The illumination device comprises also a zoom lens **433** which is connected to a number to the zoom motors **427** through a number of rods **443**, which can be moved back and forth by the zoom motors **427** as illustrated by arrow **445**. In this embodiment the zoom lens comprises a number of optical lenses **446** and each optical lens **447** is adapted to change the divergence of the light beams exiting the light collecting means. The consequence is that the divergence of the light beams can be changed by moving the zoom lens back and forth. The zoom lens is embodied as one transparent solid body for instance polymer or plastic and will appear as one illuminating surface as the diffused light will pass through the zoom lens. The areas between the optical lenses **447** is provided with angled surfaces **449** which prevents light from the surrounding to be reflected in the same direction which makes the illumination device nicer to look at. It is to be understood that the zoom lens can be embodied in many different ways for instance as one common optical lens. Further it is to be understood that the zoom lens also can be embodied as the diffusing cover where the areas **449** between the optical lenses **447** can be adapted to receive and diffuse the light generated by the second type light sources. As consequence and in such embodiment the diffuser cover **431** can be omitted.

The yoke and base can be embodied as known in prior art for instance as described in FIG. **1***a*-**1***b*. However the skilled person will be able to construct these parts in many ways.

FIG. **5** illustrates a block diagram of the illumination device according to present invention. The illumination device comprises a control unit **501** comprising a processor **503** and a memory **505**. The first group of light sources **507** and the second group of light sources **509** is connected to the control unit **501** and is arranged according to the present invention. The processor acts as controlling means and is adapted to control the first group of light sources **507** and the second group of light sources individually. Meaning the processing means can control one of the groups of light sources without controlling the other group of light sources.

The controlling can for instance adapted to controlling the other group of light sources. The controlling can for instance adapted to control the color and/or intensity of the light sources and can be based on any type of communication signals known in the art of lighting e.g. PWM, AM, FM, binary signals, etc. The first **507** and second **509** group of light sources array can thus be controlled individually and independently of each other can thus be treated as two individually and independently groups of light sources. It is to be understood that the individually light sources of each groups be controlled by the same control signal, supplied with individual control signals and/or grouped in sub-groups where each subgroup receive the same control signal.

In one embodiment the controlling means is adapted to control said first group of light sources based on an input **511** indicative of a first target color of said first group light sources. The input signal **511** can be any single capable of communication parameters and can for instance be based on one of the following protocols USITT DMX 512, USITT DMX 512 1990, USITT DMX 512-A, DMX-512-A including RDM as covered by ANSI E1.11 and ANSI E1.20 standards or Wireless DMX. ACN designates Architecture for Control Networks; ANSI E1.17-2006).

The input signal can for instance be indicative of a first target color being any parameter defining the color of the light that the first group light sources shall generate, for instance RGB values, color coordinates in color maps etc. The controlling means can be adapted to control the second group of light sources based on the input signal indicative of the first target color of whereby the second group of light sources can be adapted generate substantial the same color as the color generated by the first group of light sources. However it is also possible to integrate a color scheme such that the color of the second array is adjusted such that the color of the second group of light sources is different but esthetic matches each other according to a predetermined color scheme. The input signal can also be indicative of a second target color and the color of the second group of light sources can be controlled based on this second target color parameter.

The skilled person realizes that the illumination device also can comprise further groups of light sources which can be used to crate various effects. For instance a third group **511** of light sources that can be controlled in similar manners as the two other groups of light sources.

The second group and third group of light sources can function as background lighting with own DMX control and both color and intensity can be varied independently of the first group of light sources. They can also be intensity and color linked with primary LED color in a predetermined manner or has separate control for contrast colors or other intensity. This adjustment/control of the light sources can be done remotely from central control unit or at the fixture itself. The consequence is that a new light effect can be created as the area between the light beams can have another color emitted by the second group of light sources. This look can by dynamic if first group of light sources and the second group of light sources are independently controlled as known in the art of entertainment lighting.

It is noted that:

- the invention applies to both multichip LEDs and single color LEDs.
- the invention applies to both profile and wash luminaires.
- the invention applies to any light source technology.
- that the invention eliminates or minimizes the dotted look of an LED light fixture with multiple LED lenses exposed to the spectator.
- the second light source group can be used as new additional effect feature on the fixture and function both as an attention gimmick, but more importantly as an individual pixel when used in multiple unit setups. So it is both a mid-air beam and a lit up surface.
- the second light source group can also be used to indicate errors or other fixture status information.
- the invention creates a possibility of making the light/color visible from other angles than purely from the front.
- the secondary light source can be used as an interactive part of the fixture reacting according to surroundings.
- the illumination device according to the present invention when the fixture is used in multiple unit setups (eg. a large scale matrix) the primary light source can be turned off or dimmed, so the fixture changes from being an automated mid-air beam to become a graphical pixel with a glowing non-binding surface. Appropriate effect generator controls (eg. media servers) are then able to display video content or simple cover waves/patterns on the complete fixture setup.
- the user will be able to run two individual light sequences or media content on the same fixture. One content generated by the first group of light sources and another content generated by the second group of light sources.
- that error messages or fixture status can be communicated via colors, color combinations, flashes or other effects by the secondary light source.
- that via an internal or external sensoring/tracking technology, the secondary light source can act according to a predefined reaction pattern (color, intensity or flashing). The input could be persona behavior, temperature changes, room light level, humidity etc.).

What is claimed is:

1. An illumination device comprising a number of light sources and a number of light collecting means arranged in a housing, each of said light collecting means collecting and converting light from at least one of said light sources into a source light beam, whereby a number of source light beams are emitted from said housing, said housing comprising a diffuser cover, said diffuser cover comprising at least one diffuser region, said diffuser region receiving at least a part of said light generated by said light sources and diffusing the received light in many directions, and said diffuser cover further comprising a number of non-diffusing regions, wherein:

- said number of source light beams equals said number of non-diffusing regions;
- at least a part of each source light beam passes through a corresponding one of said non-diffusing regions as an outgoing light beam without being diffused in many directions; and
- each of said non-diffusing regions is surrounded by at least part of said diffuser region.

2. The illumination device of claim **1**, wherein at least a part of said diffuser cover protrudes from said housing.

3. The illumination device of claim **1**, wherein at least one non-diffusing region is a clear area arranged above said light collecting means.

4. The illumination device of claim **1**, wherein at least one non-diffusing region is an aperture arranged above said light collecting means.

5. The illumination device of claim **1**, wherein said number of light sources are arranged in at least a first group of light sources and a second group of light sources, said number of light collecting means collecting and converting light from said first group of light sources into a number of

source light beams, and said diffuser region receives light generated by said second group of light sources and diffuses said received light.

6. The illumination device of claim **5**, wherein said first group of light sources and said second group of light sources are independently controlled.

7. A moving head light fixture comprising:

a base;

a yoke rotatably connected to said base: and

a head rotatably connected to said yoke;

wherein said head comprises a illumination device according to claim **1**.

8. An illumination device comprising a plurality of RGBW LEDs and a plurality of light collectors arranged in a housing, each of said plurality of RGBW LEDs comprising a red die, a green die, a blue die and a white die, each of said plurality of light collectors collecting light from a corresponding one of the plurality of RGBW LEDs and each being adapted to mix said collected light into a light beam, whereby a plurality of light beams are emitted from said housing, said illumination device further comprising a diffuser cover, said diffuser cover comprising at least one diffuser region diffusing received light in many directions, said diffuser cover further comprising a number of non-diffusing regions, wherein:

said diffuser cover is formed as a zoom lens comprising a number of optical lenses, each of said optical lenses forming a non-diffusing region and each being adapted to change a divergence of said plurality of light beams; and

an area between said optical lenses forms said at least one diffuser region.

9. The illumination device of claim **8**, wherein said zoom lens is connected to at least one zoom motor configured to move said zoom lens back and forth in relation to said plurality of light collectors, whereby the divergence of said plurality of light beams can be changed.

10. The illumination device of claim **8**, wherein each of said plurality of light collectors are arranged in a light collector holder adapted to position each of said plurality of light collectors above one of said plurality of RGBW LEDs.

11. The illumination device of claim **8**, wherein a second group of light sources is arranged below said zoom lens, and wherein said received light comprises light generated by the second group of light sources, and wherein said at least one diffuser region receives said light generated by said second group of light sources and diffuses said received light in many directions.

* * * * *