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Published:
— *with international search report (Art. 21(3))*
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(54) Title: BAY LUMINAIRE WITH YOKE ASSEMBLY

(57) Abstract: A high bay luminaire includes a heat sink having a substantially disc-shaped configuration. A light emitter is connected to the heat sink. A reflector is connected to the heat sink. A yoke is connected to the heat sink. The yoke has a first arm, a second arm, and a top bar. A driver is connected to the yoke so that the driver extends between the first arm and the second arm.

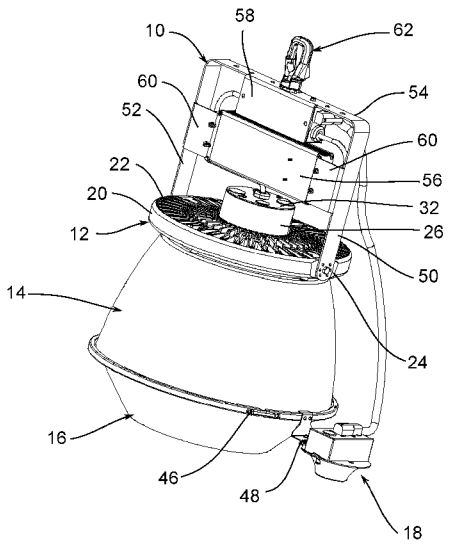


FIG. 1

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BAY LUMINAIRE WITH YOKE ASSEMBLY

RELATED APPLICATION(S)

[0001] This application is based on U.S. provisional application Serial No. 62/326,189, filed April 22, 2017, the disclosure of which is incorporated herein by reference in its entirety and to which priority is claimed.

FIELD

[0002] Various exemplary embodiments relate to light fixtures or luminaires, for example indoor luminaires.

BACKGROUND

[0003] Light fixtures, or luminaires, are used with electric light sources to provide an aesthetic and functional housing in both interior and exterior lighting applications. For example, high bay luminaires can be used in larger open indoor environments such as heavy industrial settings, warehouses, gyms, churches, and shopping malls. Conventional high bay lighting fixtures for commercial and industrial applications are often mounted or suspended from ceiling joists high above the floor.

[0004] Recently, lighting fixtures have begun using light emitting diodes (LEDs) as a light source. The use of LEDs comes with unique light distribution and thermal management requirements for both the light emitters and the control components required to run the light fixtures. These considerations can lead to complex housing and heat dissipation designs in an attempt to balance performance and aesthetic characteristics.

SUMMARY

[0005] According to an exemplary embodiment, a high bay luminaire includes a heat sink having a substantially disc-shaped configuration. A light emitter is

connected to the heat sink. A reflector is connected to the heat sink. A yoke is connected to the heat sink. The yoke has a first arm, a second arm, and a top bar. A driver is connected to the yoke so that the driver extends between the first arm and the second arm.

[0006] According to another exemplary embodiment, a high bay luminaire includes a heat sink having a body, a plurality of heat fins, and an outer edge. A light emitter is connected to the heat sink. A reflector is connected to the heat sink. A yoke is connected to the heat sink. The yoke has a first arm, a second arm, a top bar, a first bracket extending from the first arm, and a second bracket extending from the second arm. The first bracket and the second bracket at least partially define an open space therebetween. A driver connected to the first bracket and the second bracket to extend across the open space, wherein the portion of the driver extending across the open space is exposed to the ambient environment.

[0007] According to another exemplary embodiment, a high bay luminaire includes a heat sink having a body, a plurality of heat fins, and an outer edge. A light emitter is connected to the heat sink. A reflector is connected to the heat sink. A yoke has a first arm connected to the heat sink, a second arm connected to the heat sink, a top bar, and a door pivotally connected to the first arm and the second arm. A driver is connected to the yoke.

[0008] BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The aspects and features of various exemplary embodiments will be more apparent from the description of those exemplary embodiments taken with reference to the accompanying drawings, in which:

[0010] FIG. 1 is a front perspective view of an exemplary luminaire;

[0011] FIG. 2 is a top perspective view of the heat sink of FIG. 1;

[0012] FIG. 3 is a bottom view of the heat sink and light emitter of FIG. 1;

[0013] FIG. 4 is a bottom perspective view of the luminaire of FIG. 1;

[0014] FIG. 5 is a partially exploded view of the heat sink and yoke assembly of FIG. 1;

[0015] FIG. 6 is a front perspective view of another exemplary luminaire;

[0016] FIG. 7 is a rear perspective view of a portion of the yoke assembly of FIG. 6;

[0017] FIG. 8 is a rear perspective view of the door of the yoke assembly of FIG. 6; and

[0018] FIG. 9 is a partial view of the luminaire of FIG. 6 with the door of the yoke assembly removed.

DETAILED DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0019] In an exemplary embodiment, a high bay luminaire includes a yoke assembly 10, one or more control components, a heat sink 12, a reflector 14, a lens 16, and a sensor 18. One or more light emitters are connected to the heat sink 12. The type of reflector 14 and lens 16 can be changed or removed entirely to provide a desired light output as would be understood by one of ordinary skill in the art.

[0020] As shown in FIG. 2, the heat sink 12 has a base with a substantially disc-shaped configuration and a substantially circular outer portion 20. A plurality of heat fins 22 extend from the outer portion 20 to an inner portion of the heat sink 12. The heat fins 22 have a substantially Y-shape configuration with a base portion positioned towards the interior of the heat skink 12 splitting into two tines which diverge as they extend toward the outer portion 20. Different sizes, shapes, and configurations of heat fins 22 can also be used depending on the desired thermal characteristics. One or more outer mounting portions 24 are provided on the outer edge to receive components associated with the luminaire, for example the yoke assembly 10. In this exemplary embodiment. The size, shape, and configuration of the heat sink 12 can be modified for different applications.

[0021] A cylindrical wall 26 extends from an upper portion of the heat sink 12 to define a recessed area 28. The recessed area 28 can act as a junction housing to make an electrical connection between the light emitter and one or more control components. One or more bosses 30 are positioned in the recessed area 28. A plate 30 having a diameter substantially equal with the outer edge of the cylindrical wall

26 can be connected over the recessed area 28 using fasteners that extend into the bosses 30.

[0022] As shown in FIG. 3, the bottom of the heat sink 12 includes a lower recessed portion 34 for receiving a light emitter. In an exemplary embodiment, the light emitter includes a plurality of LEDs 36 connected to a PCB 38. A backing (not shown) can be placed between the light emitter 16 and the heat sink 12. The backing can be made from different materials to provide insulation or increased heat transfers depending on the needed thermal characteristics. The light emitter 16 can be connected by one or more fasteners extending into the lower recessed portion 34. A lens 40 can also be connected to the heat sink 12 over the light emitter. A mounting ring 42 is connected to the heat sink 12 to hold the lens 40 in place. A gasket can be positioned between the mounting ring 42 and the heat sink 12 and the lower recessed portion 34 can include a number of stepped rims to define different widths for receiving the light emitter PCB 38, the lens 40, and the mounting ring 42.

[0023] As best shown in FIG. 4, the reflector 14 is removably connected to the heat sink 12 by one or more fasteners. Keyhole slots 44 can be provided in the reflector 14 to allow for quick removal and attachment without a tool. The sensor 18 is connected to the reflector 14 through a hose-clamp style connector 46 that goes around the reflector 14 and has a bracket 48 that connects to the sensor. Different types of sensors 18 can be used, including occupancy, motion, daylight, and combination sensors. A cable operatively connects the sensor 18 with the control components.

[0024] According to an exemplary embodiment, the yoke assembly 10 includes a first arm 52, a second arm 52, and a top bar 54 as best shown in FIG. 5. The yoke is substantially open to the surrounding environment to increase heat transfer, for example there is no other housing positioned around the yoke assembly 10. The first and second arms 50, 52 are received in the first and second outer mounting portions 24. A driver 56 is connected to the first and second arms 50, 52 and a junction box 58 is connected to the top bar 54. The driver 56 can extend between the first and second arms 50, 52 and be connected by a pair of brackets 60. A power supply line can be

run into the junction box 58 and a connection made to one or more conductors that extend to the driver 56. The junction box 58 can include a removable cover to provide access to a user. On or more conductors extend from the junction box 58 to the driver 56 and from the driver 56 to the recessed portion 28 of the heat sink 12 and the sensor 18 as shown in FIG. 1. The top bar 54 includes a threaded aperture for receive a hook or a pendant mount. FIG. 5 shows a hook mount 62 that includes a body with a C-shaped portion and a gate biased into a closed position.

[0025] FIGS. 6-9 show another exemplary embodiment of a high bay luminaire having a yoke assembly 110, a heat sink 112, a reflector 114, and a lens 116. The luminaire also includes one or more control components, for example a sensor 118, a relay module 120, and one or more control components positioned inside of the yoke assembly 110. The heat sink is substantially similar to the one shown in FIGS. 1-5 and includes a similar light emitter connected thereto.

[0026] The type of reflector 114 and lens 116 can be changed or removed entirely to provide a desired light output as would be understood by one of ordinary skill in the art. The reflector 114 is removably connected to the heat sink 112 by one or more fasteners. Mounting posts 124 can extend from the bottom of the heat sink 112 and receive fasteners that connect the reflector. The sensor 118 is connected to the reflector 114 through a hose-clamp style connector 126 that goes around the reflector 114 and has a bracket 128 that connects to the sensor 118.

[0027] Different types of sensors 118 can be used, including occupancy, motion, daylight, and combination sensors. A cable operatively connects the sensor 118 with one or more different control components. In an exemplary embodiment, the relay module 120 is connected to the yoke assembly 110. The first arm 130 can include an opening for connecting the relay module 120. A threaded member can connect to the relay module 120 and the first arm 130. The relay module 120 can be a radio frequency device that can control loads based on an input, for example from the occupancy sensor 118.

[0028] According to an exemplary embodiment, the yoke assembly 110 includes a first arm 130, a second arm 132, and a top bar 134 as best shown in FIG. 7. A rear

support 136 extends between the first and second arms 130, 132 for receiving one or more control components. A first mounting bracket 138 extends from the first arm 130 and a second mounting bracket 140 extends from the second arm 132. The first and second mounting brackets 138, 140 are separated from one another by an open space. The top bar 134 can include a slot 142 for receiving a mounting assembly.

[0029] According to some embodiments, the yoke assembly 110 also includes a door 144. FIG. 9 shows an exemplary embodiment of the door 144 that can be rotatably connected to the first arm 130 and the second arm 132. The door 144 includes a front wall 146 and a bottom portion 148. The bottom portion 148 includes an opening 150 that acts as a conductor conduit and a pair of hinge members 152. The hinge members 152 include tabs that rotatably connect to the mounting arms 130, 132. The hinge connection can include openings on the hinge members 152 and pins 154 extending from the mounting arms 130, 132, although these features can be reversed and other rotatable connections can be used. A pair of openings 156 are provided in the front wall 146 that can receive a fastener, for example the spring clips 158 as shown in FIG. 6.

[0030] FIG. 9 shows an exemplary control component assembly connected to the yoke assembly 110. A driver 160 is connected to the first and second mounting brackets 138, 140 and extends across the open space. Different types and sizes of drivers can be connected and extend across the open space so at least a portion of the driver is open to the environment to increase heat transfer. A control unit 162 and a surge protector 164 are connected to the rear support 136. The control unit 162 can be operatively connected to the driver 160 to control the amount of power provided to the light emitter, for example based on input from the sensor 118 and/or the relay 130. A pendant mount 166 is connected to the slot 142 in the top bar 134 of the yoke assembly 110.

[0031] The foregoing detailed description of the certain exemplary embodiments has been provided for the purpose of explaining the general principles and practical application, thereby enabling others skilled in the art to understand the disclosure for various embodiments and with various modifications as are suited to the

particular use contemplated. This description is not necessarily intended to be exhaustive or to limit the disclosure to the exemplary embodiments disclosed. Any of the embodiments and/or elements disclosed herein may be combined with one another to form various additional embodiments not specifically disclosed. Accordingly, additional embodiments are possible and are intended to be encompassed within this specification and the scope of the appended claims. The specification describes specific examples to accomplish a more general goal that may be accomplished in another way.

[0032] As used in this application, the terms "front," "rear," "upper," "lower," "upwardly," "downwardly," and other orientational descriptors are intended to facilitate the description of the exemplary embodiments of the present application, and are not intended to limit the structure of the exemplary embodiments of the present application to any particular position or orientation. Terms of degree, such as "substantially" or "approximately" are understood by those of ordinary skill to refer to reasonable ranges outside of the given value, for example, general tolerances associated with manufacturing, assembly, and use of the described embodiments.

What is claimed:

1. A high bay luminaire comprising:
   a heat sink having a substantially disc-shaped configuration;
   a light emitter connected to the heat sink;
   a reflector connected to the heat sink;
   a yoke connected to the heat sink and having a first arm, a second arm, and a top bar; and
   a driver connected to the yoke so that the driver extends between the first arm and the second arm.

2. The luminaire of claim 1, wherein the heat sink includes a non-uniform first connecting portion and second connecting portion.

3. The luminaire of claim 1, wherein an occupancy sensor is connected to the reflector.

4. The luminaire of claim 1, wherein the heat sink includes a cylindrical wall surround a recessed portion.

5. The luminaire of claim 1, wherein the yoke and driver are substantially open to the ambient environment.

6. The luminaire of claim 1, further comprising a junction box connected to the yolk.

7. The luminaire of claim 1, wherein the yolk includes a door pivotally connected to the first arm and the second arm.

8. A high bay luminaire comprising:
   a heat sink having a body, a plurality of heat fins, and an outer edge;
   a light emitter connected to the heat sink;
   a reflector connected to the heat sink;

a yoke connected to the heat sink and having a first arm, a second arm, a top bar, a first bracket extending from the first arm, and a second bracket extending from the second arm, wherein the first bracket and the second bracket at least partially define an open space therebetween;

a driver connected to the first bracket and the second bracket to extend across the open space, wherein the portion of the driver extending across the open space is exposed to the ambient environment.

9. The luminaire of claim 8, wherein an occupancy sensor is connected to the reflector.

10. The luminaire of claim 8, wherein the yolk includes a door pivotally connected to the first arm and the second arm.

11. The luminaire of claim 10, wherein the door includes a slot for receiving a fastener.

12. The luminaire of claim 11, wherein the fastener is a spring clip.

13. The luminaire of claim 8, wherein the yoke includes a rear support for receiving one or more control components.

14. The luminaire of claim 8, further comprising a relay module connected to the yoke.

15. The luminaire of claim 14, wherein the relay module is connected to one of the first arm and the second arm.

16. A high bay luminaire comprising:

a heat sink having a body, a plurality of heat fins, and an outer edge;

a light emitter connected to the heat sink;

a reflector connected to the heat sink;

a yoke having a first arm connected to the heat sink, a second arm connected to the heat sink, a top bar, and a door pivotally connected to the first arm and the second arm; and

a driver connected to the yoke.

17. The high bay luminaire of claim 16, wherein the door includes a hinge member receiving a pin extending from the first arm.

18. The high bay luminaire of claim 16, wherein the yoke includes a first bracket extending from the first arm, and a second bracket extending from the second arm, wherein the first bracket and the second bracket at least partially define an open space therebetween and the driver is connected to the first bracket and the second bracket to extend across the open space, and wherein the portion of the driver extending across the open space is exposed to the ambient environment.

19. The luminaire of claim 16, wherein the yoke includes a rear support for receiving one or more control components.

20. The luminaire of claim 8, further comprising a relay module connected to one of the first arm and the second arm.

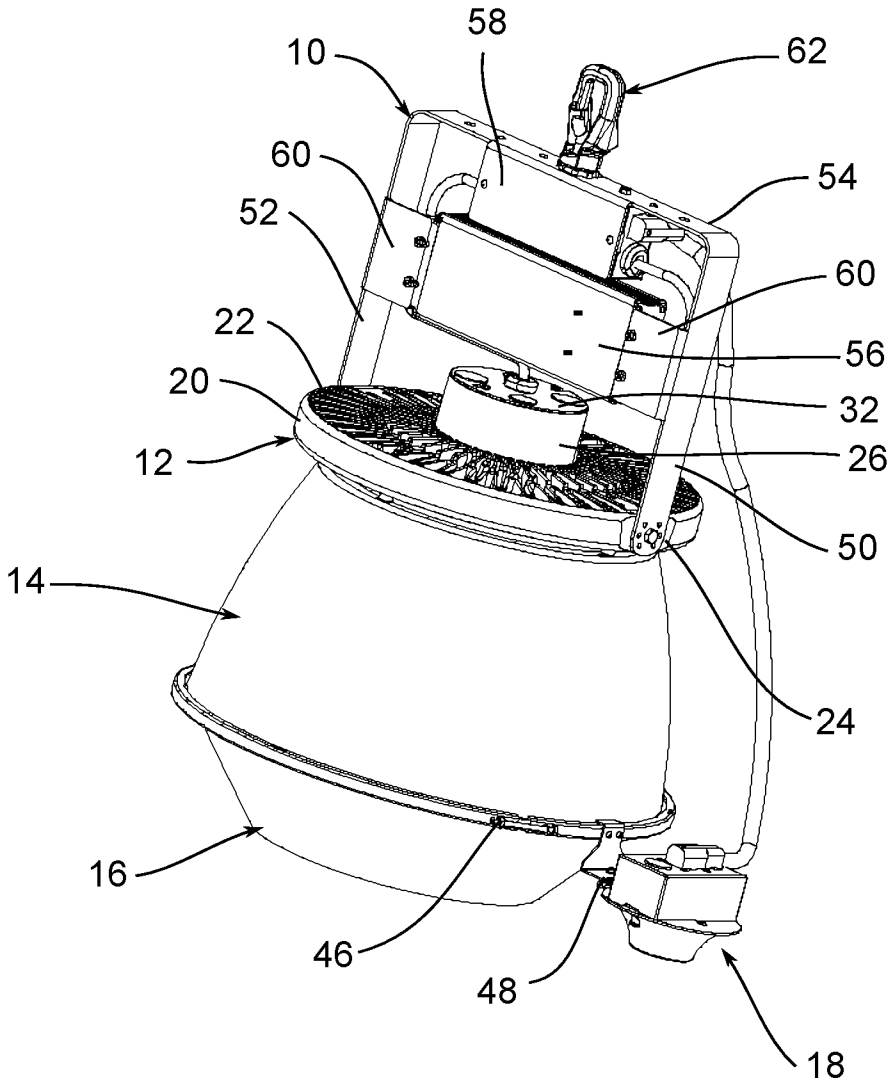


FIG. 1

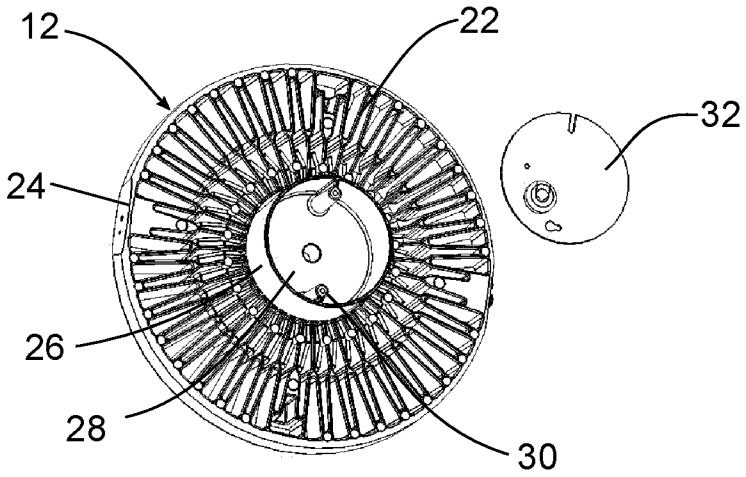


FIG. 2

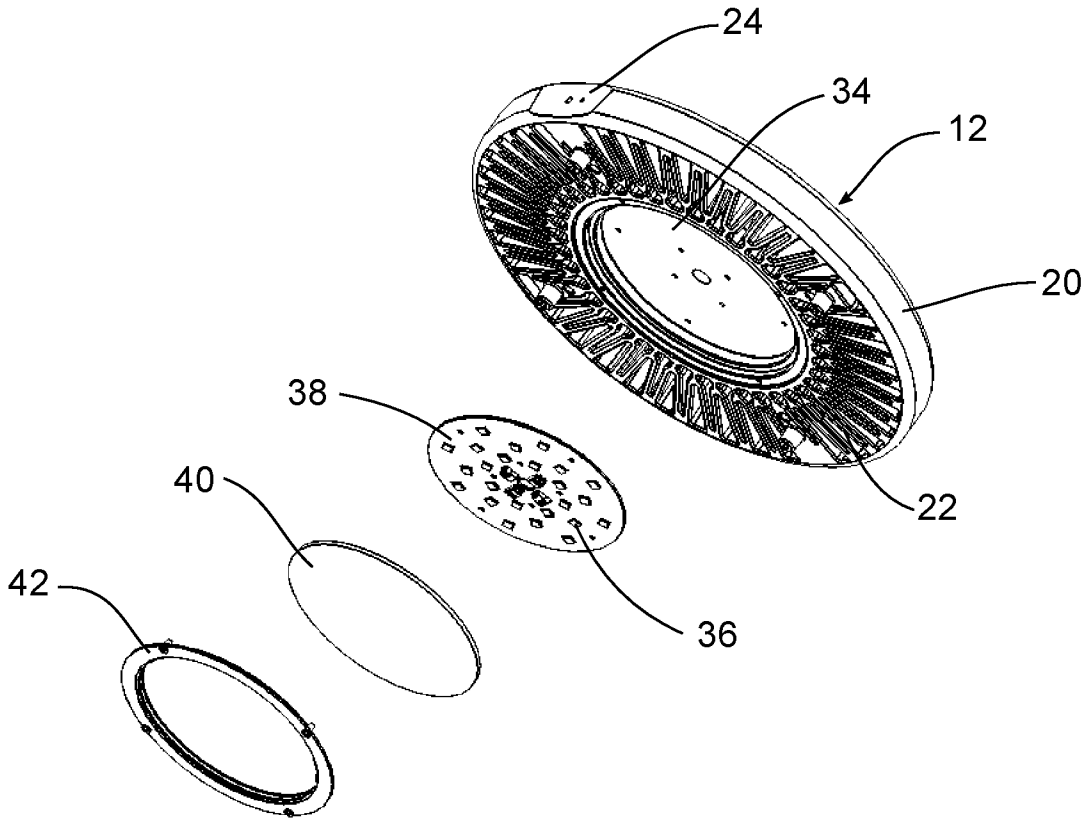


FIG. 3

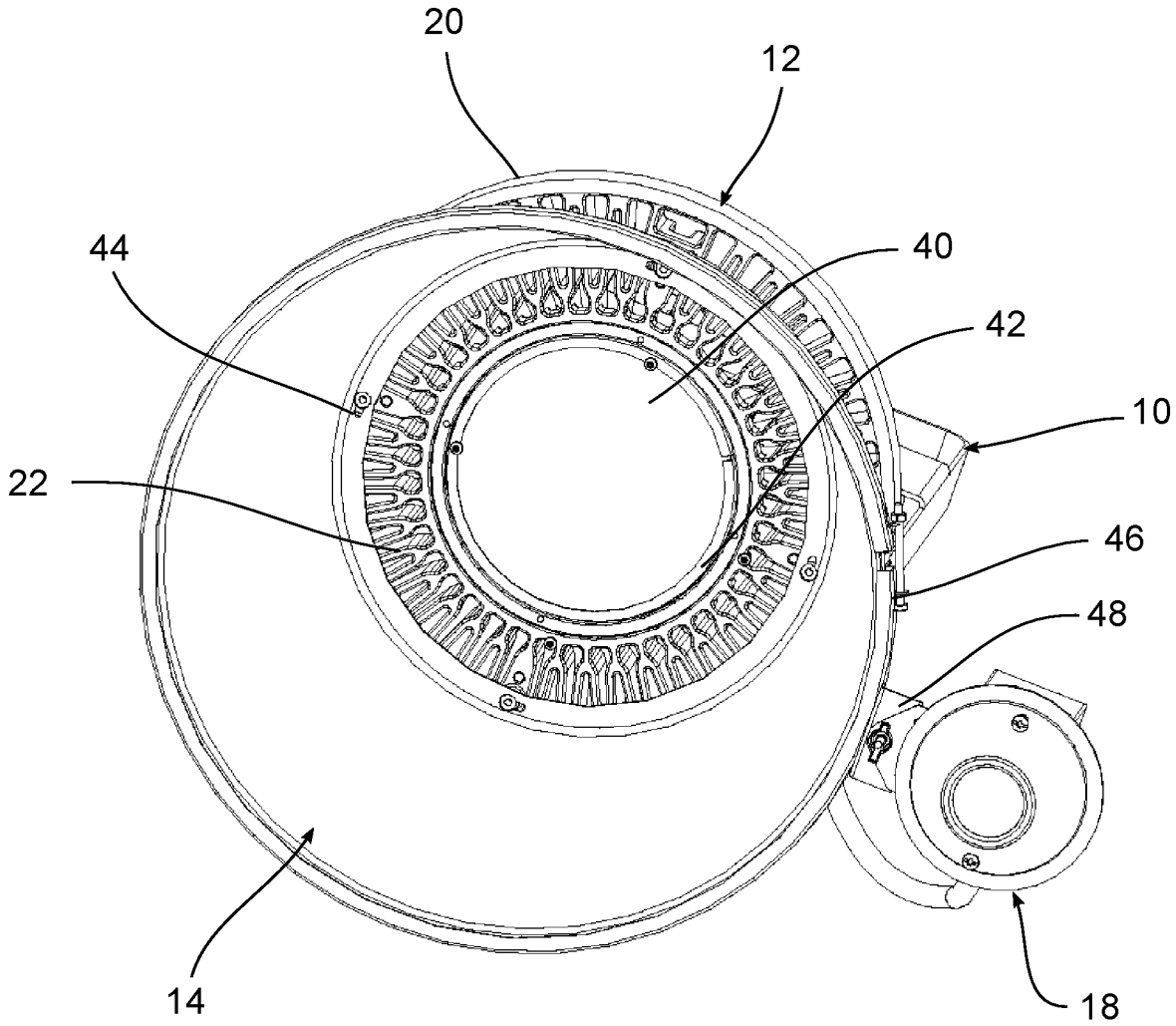


FIG. 4

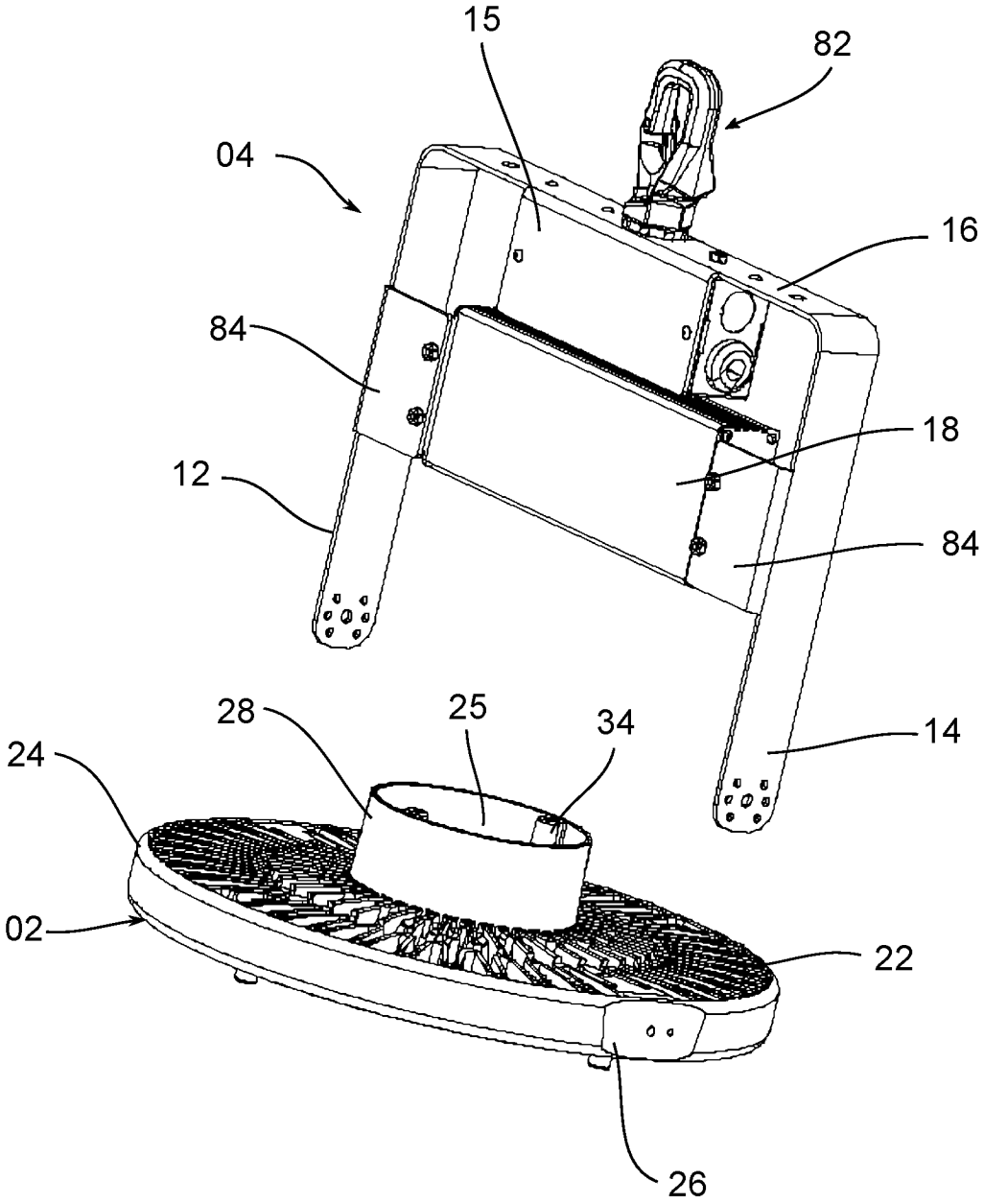


FIG. 1

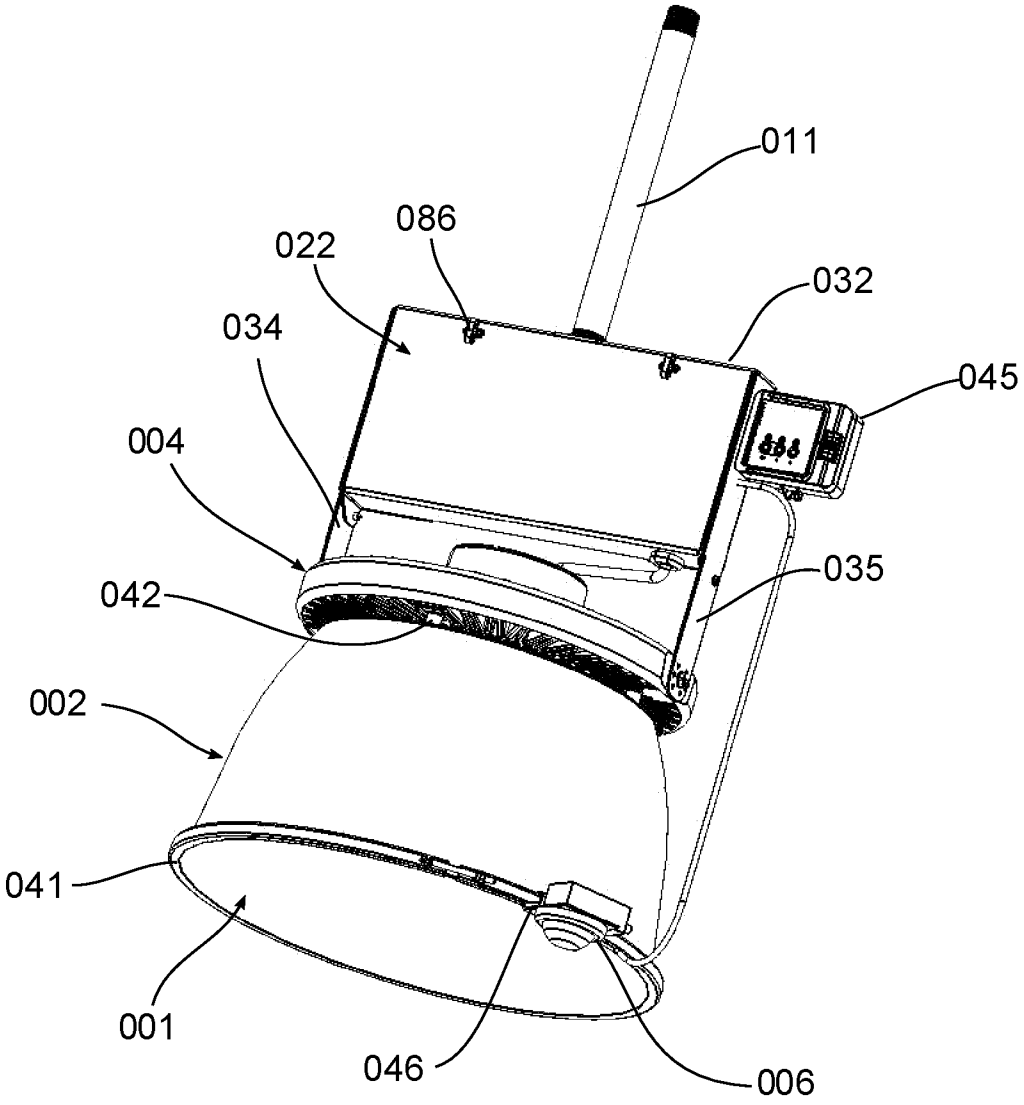


FIG. 1

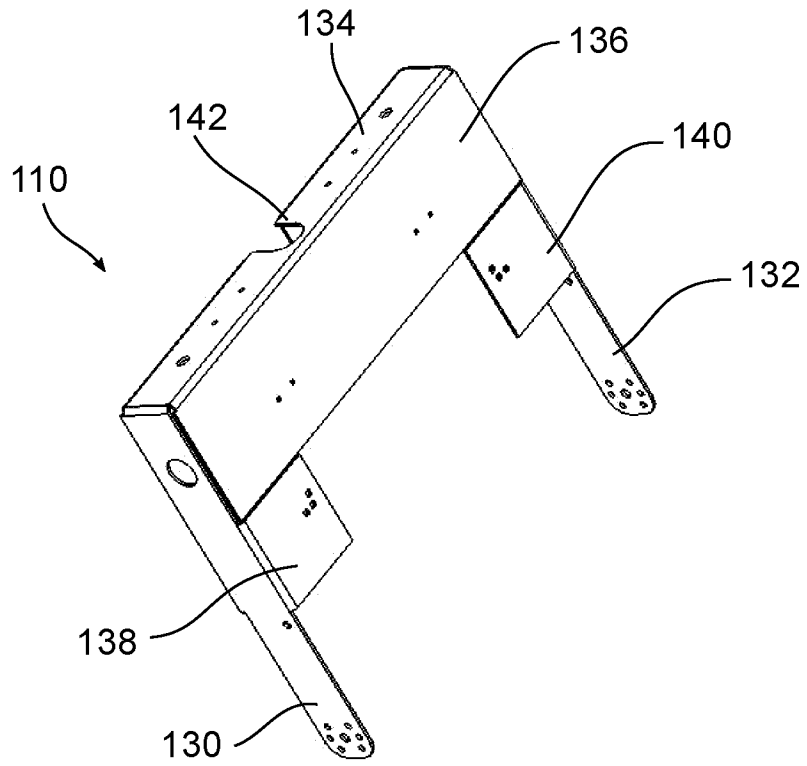


FIG. 7

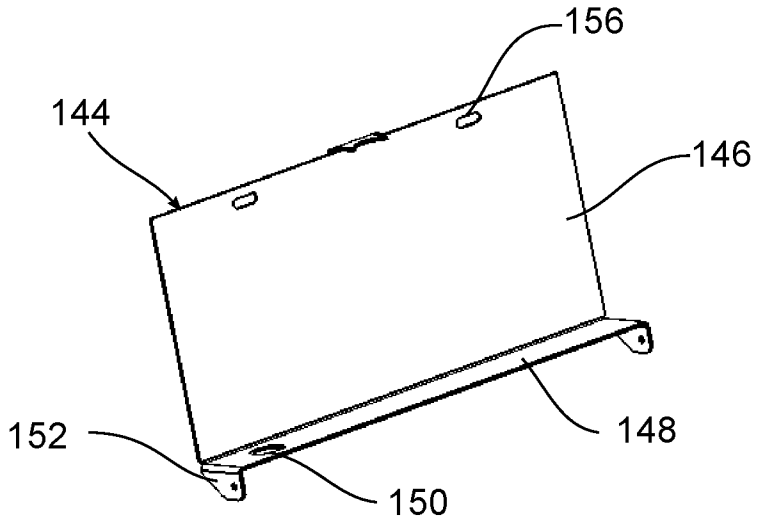


FIG. 8

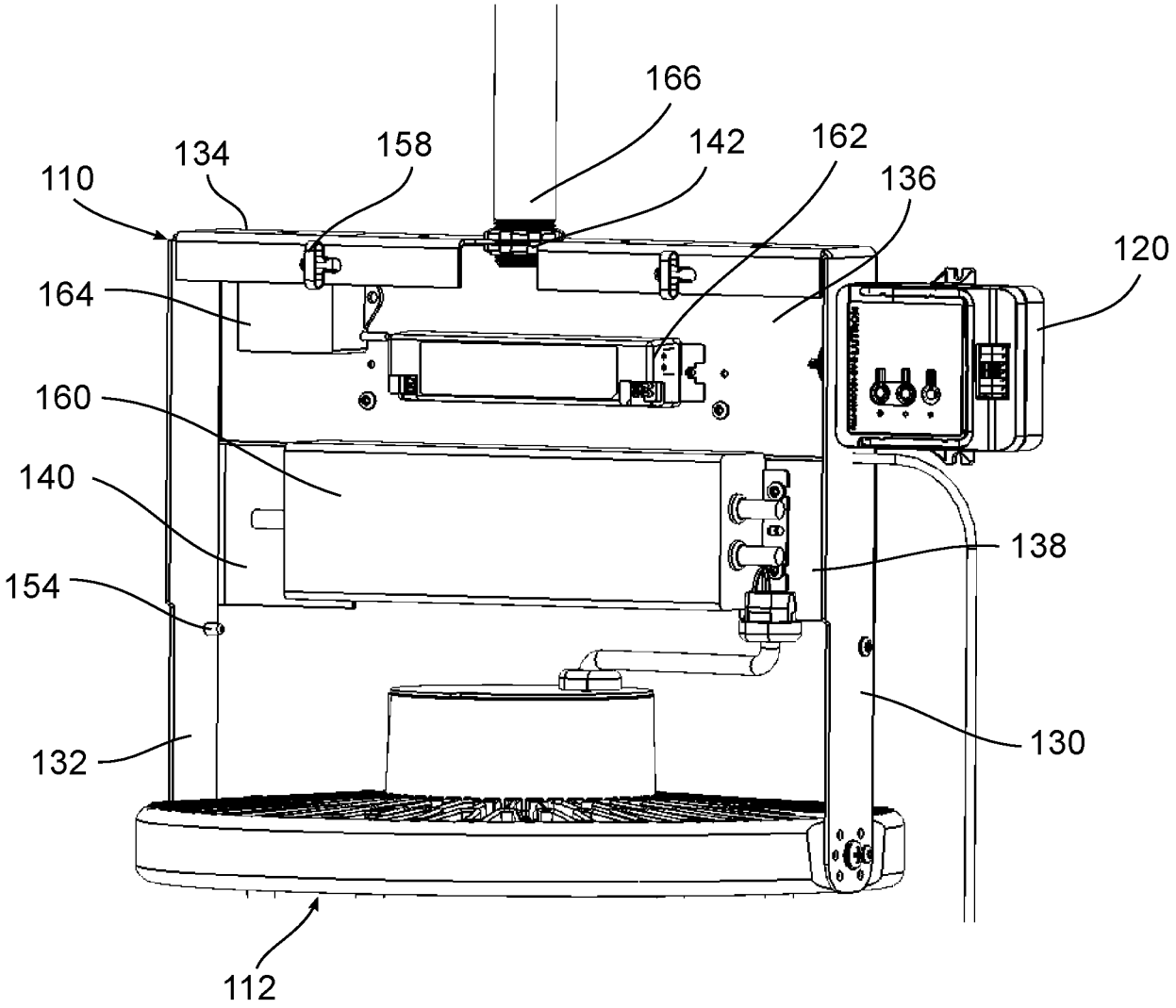


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/029088

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - F21V 29/00; F21V 33/00; F21V/1106 (2017.01)
CPC - F21K 9/50; F21V 11/06; F21V 29/00; F21V 33/00 (2017.02)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC - 362/234; 362/294 (keyword delimited)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2015/0192274 A1 (KUBIS et al) 09 July 2015 (09.07.2015) entire document	1-15
Y	US 2009/0103294 A1 (ZHANG et al) 23 April 2009 (23.04.2009) entire document	1-15
Y	US 2015/0316230 A1 (XICATO, INC.) 05 November 2015 (05.11.2015) entire document	3, 9
Y	US 2014/0056017 A1 (CARLONI et al) 27 February 2014 (27.02.2014) entire document	7, 10-12
Y	US 5,003,430 A (VONARX et al) 26 March 1991 (26.03.1991) entire document	12, 14, 15

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 August 2017	29 AUG 2017
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, VA 22313-1450 Facsimile No. 571-273-8300	Authorized officer Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/029088

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:
See extra sheet(s).

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:
1-15

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/029088

Continued from Box No. III Observations where unity of invention is lacking

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1-15, drawn to a high bay luminaire comprising a first and second bracket.
Group II, claims 1-7,16-20, drawn to a high bay luminaire comprising a door.

The inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the special technical feature of the Group I invention: a first bracket extending from the first arm, and a second bracket extending from the second arm, wherein the first bracket and the second bracket at least partially define an open space therebetween as claimed therein is not present in the invention of Group II. The special technical feature of the Group II invention: a door pivotally connected to the first arm and the second arm as claimed therein is not present in the invention of Group I.
Groups I and II lack unity of invention because even though the inventions of these groups require the technical feature of a heat sink having a body; a light emitter connected to the heat sink; a reflector connected to the heat sink; a yoke having a first arm connected to the heat sink, a second arm connected to the heat sink; a driver connected to the yoke, this technical feature is not a special technical feature as it does not make a contribution over the prior art.

Specifically, US 2015/0192274 A1 (KUBIS et al) 09 July 2015 (09.07.2015) teaches a heat sink having a body (Paras. 31 and 34); a light emitter connected to the heat sink (Para. 34 and Fig. 4); a reflector connected to the heat sink (Para. 57); a yoke having a first arm connected to the heat sink, a second arm connected to the heat sink (Para. 30 and Fig. 1); a driver connected to the yoke (Para. 30 and Fig. 1).

Since none of the special technical features of the Group I or II inventions are found in more than one of the inventions, unity of invention is lacking.