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- (72) **Inventors; and**
- (71) **Applicants :** MILLARD, Paul, Stefanus [ZA/ZA]; 12 Honeyguide, Blue Gill, Glen Marais, 1619 Kempton Park (ZA). VAN NIEKERK, Charl [ZA/ZA]; 16 Green Acres, 826 Klippan Road, 0182 Montana Gardens (ZA).
- (74) **Agents:** DAVIES, James, Hasely et al.; Adams & Adams, PO Box 1014, 0001 Pretoria (ZA).
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(54) **Title:** AN ELECTRICAL LIGHTING APPARATUS AND A SEAL FOR AN ELECTRICAL LIGHTING APPARATUS

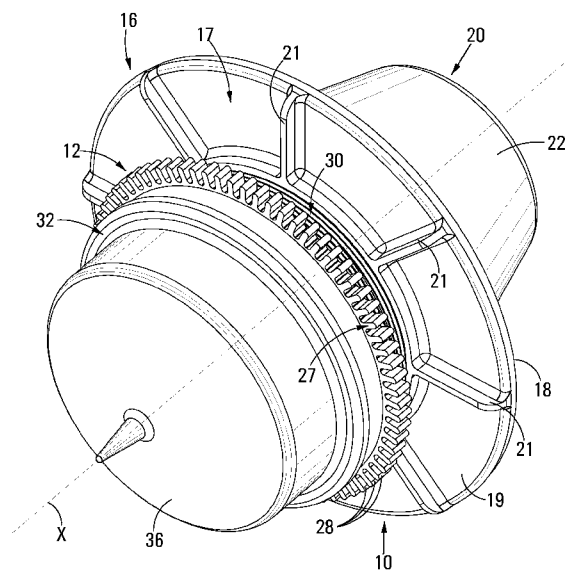


FIG 1

(57) **Abstract:** The invention relates to an electrical lighting apparatus (10) and to a seal (16). The lighting apparatus (10) includes a body (12), defining a body axis X, a male, screw-type, electrical connector (14) which projects longitudinally from the body (12) and a radially outwardly projecting seal (16). The body (12) comprises an axially inner portion (30), which has external screw-thread on an outer surface (13) thereof, and an axially outer portion (32). The seal (16) comprises an annular attachment formation (17) which includes a flange (19) and internal screw-thread for screw-threadingly engaging the outer surface (13) and an annular seal member (18) which is attached to an underside of the flange (19). When connected to a light fitting (20), the seal (16) is displaceable relative to the body (12) between an open position and a sealed position in which the seal sealingly abuts the light fitting (20).

## **An electrical lighting apparatus and a seal for an electrical lighting apparatus**

### **5 FIELD OF INVENTION**

This invention relates to lighting in general and specifically to a removable electrical lighting apparatus in the form of a light bulb.

### **10 BACKGROUND OF INVENTION**

Due to advances made in technology, incandescent light bulbs are slowly being phased out and are being replaced with more energy efficient technologies such as Light-Emitting Diodes (LEDs), for example.

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Problems have been encountered when attempting to retrofit light bulbs using the new technology to existing electrical light fittings because the dimensions of the new light bulbs do not always match the dimensions of the existing light fittings. In outdoor applications, specifically, it is important that a proper fit is achieved between a new bulb and an existing light fitting in order to prevent the ingress of water and dirt into the light fitting which may cause damage to or lead to premature failure of the light. In order to overcome this problem, adapters have been designed to suite specific needs. These adapters, however, are individually fabricated for each specific application which is undesirable and gives rise to manufacturing costs.

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It is an object of this invention to provide a lighting apparatus which at least alleviates these problems.

### **30 SUMMARY OF INVENTION**

In accordance with the invention, there is provided an electrical lighting apparatus which is connectable to an electrical light fitting, the lighting apparatus including:

a body defining a body axis;  
an electrical connector which projects from the body and is electrically connectable to the light fitting; and  
a seal which is connected to, and configured for engagement with the  
5 body such that the seal is displaceable relative to the body, wherein,  
when the lighting apparatus is connected to the light fitting, the seal is  
operatively displaceable relative to the body, along the body axis,  
between an open position, in which the seal does not abut the light  
fitting, and a sealed position, in which the seal sealingly abuts the light  
10 fitting in order to inhibit ingress of water and/or dirt into the light fitting.

It is to be understood that, in the context of this specification, the word "light" is not limited to electromagnetic radiation in the visible spectrum but may include, for example, infra-red light.

15 The seal may be peripherally connected to the body about the body axis. The seal may be axially displaceable relative to the body along the body axis.

20 The seal may project radially outwardly from the body. The seal may be circumferentially and axially displaceable relative to the body about the body axis.

The seal may be annular and coaxially arranged about the body.

25 The seal may be screw-threadingly engaged with the body such that the seal is helically/spirally displaceable relative to the body about the body axis.

The seal may include:

an attachment formation which is connected to the body; and  
30 a seal member which is attached to the attachment formation.

The attachment formation may be annular and may include a radially outwardly projecting flange to which the seal member is attached such that

the attachment formation is configured operatively to urge the seal member against the light fitting.

5 The attachment formation may include an internal screw-thread and the body may include an external screw-thread such that the attachment formation screw-threadingly engages the body.

The attachment formation may include gripping formations which allow an operator to grip and thus displace the seal relative to the body.

10 The lighting apparatus may include at least one electrical light source which is electrically connected to the electrical connector.

15 The electrical light source may be in the form of a Light-Emitting Diode. The lighting apparatus may further include a light reflector and a heat sink which is thermally connected to the LED.

20 The electrical connector may be a male type electrical connector configured to be received within a female electrical socket of the light fitting. The electrical connector may be screw-type connector. Alternatively, the electrical connector may be a bayonet-type connector.

25 In accordance with a further aspect of the invention, there is provided a seal for an electrical lighting apparatus which is connectable to an electrical light fitting, the seal having a central aperture for accommodating a body of the lighting apparatus, the seal being configured for screw-threaded engagement with the body of the lighting apparatus such that, when the lighting apparatus is connected to the light fitting, the seal is operatively displaceable relative to the body of the lighting apparatus between an open position, in which the seal  
30 does not abut the light fitting, and a sealed position in which the seal sealingly abuts the light fitting in order to inhibit ingress of water and/or dirt into the light fitting.

The seal may include an attachment formation which is configured for screw-threaded engagement with the body of the lighting apparatus and a seal member which is attached to the attachment formation.

- 5 The attachment formation may project operatively outward away from the lighting apparatus and may include a plurality of gripping formations which allow an operator to grip and rotate the seal relative to the lighting apparatus.

## BRIEF DESCRIPTION OF DRAWINGS

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The invention will now be further described, by way of example, with reference to the accompanying drawings.

In the drawings:

- 15 **Figure 1** shows a three-dimensional view of an electrical lighting apparatus, in accordance with the invention, fitted to a light fitting;
- Figure 2** shows a sectional view through the lighting apparatus and light fitting of figure 1;
- 20 **Figure 3** shows a three-dimensional view of the lighting apparatus alone, in which a cover has been omitted for clarity; and
- Figure 4** shows an exploded three-dimensional view of the lighting apparatus including a seal in accordance with the invention.

## 25 DETAILED DESCRIPTION OF AN EXAMPLE EMBODIMENT

In the figures, reference numeral 10 refers generally to an electrical lighting apparatus in accordance with the invention. The lighting apparatus 10 is in the form of a replaceable light bulb, in particular an obstruction light bulb for  
30 indicating the presence of an obstruction which may be dangerous to an aircraft in flight. In figures 1 and 2, the lighting apparatus 10 is illustrated as being received within an electrical light fitting 20, only part of which has been illustrated in the figures. The light fitting 20 comprises a cup-shaped base portion 22 and a conventional screw-type, female electrical socket 23 (see

figure 2), centrally arranged within the base portion 22. The socket 23 defines an opening for receiving a male connector 14 of the lighting apparatus 10.

During ordinary use, the lighting apparatus 10 is externally mounted to a tower or mast to act as a visual warning to air traffic and, for this reason, the lighting apparatus 10 is exposed to changing weather conditions including wind, rain and occasionally hail, etcetera. In order to prevent damage and/or malfunction of the lighting apparatus 10, the electrical components need to be isolated from the elements and contaminants which include water.

With particular reference to figure 2, the lighting apparatus 10 includes a body 12, defining a body axis X, the body 12 comprising an axially inner portion 30 and an axially outer portion 32, and the conventional male, screw-type, electrical connector 14 which projects longitudinally from the body 12 along the body axis X. The connector 14 includes a connector axis which in this example is co-axial with the body axis and also indicated by axis X. The axially inner portion 30 of the body 12 has external screw-thread on an outer surface 13. The lighting apparatus 10 further includes a radially outwardly projecting seal 16 which is arranged around a periphery of the screw-threaded outer surface 13 of the inner portion 30 of the body 12.

The seal 16 comprises an annular attachment formation 17 which includes a flange 19, which projects radially outwardly away from the body 12, and internal screw-thread for screw-threadingly engaging the outer surface 13 of the inner portion 30 of the body 12. The seal 16 further includes an annular seal member 18 which is attached to an underside of the flange 19 of the attachment formation 17. The attachment formation 17 further includes a number of equiangularly spaced apart gripping formations in the form of radially extending ridges 21 formed on an outer surface of the flange 19, opposite the seal member 18.

The seal 16 is helically displaceable relative to the body 12 along the axis X by screwing the seal 16 along the path defined by the external screw-thread formed on the outer surface 13 of the body 12.

The lighting apparatus 10 further includes a light source in the form of a number of Light-Emitting Diodes (LEDs) 24 (see figure 3) which are arranged on a printed circuit board (PCB) 26. In figure 3, a cover 36 of the lighting apparatus 10, as well as the base portion 22 of the light fitting 20, have been omitted for clarity.

A disc-shaped heat sink 27, which includes a plurality of radially extending, peripherally spaced apart, protuberances in the form of teeth or fingers 28, is sandwiched between the inner portion 30 and the outer portion 32 of the body 12. A radially outwardly diverging reflector 34 is arranged immediately above the LEDs 24. The reflector 34 is covered by the removable dome-shaped cover 36 which operatively screws into internal screw-thread 42 (see figure 2) formed on the outer portion 32 of the body 12. The outer portion 32, heat sink 27 and inner portion 30 are secured together by a number of fasteners 5 which extend through the respective portions 30, 32.

In use, the male connector 14 of the lighting apparatus 10 is screwed into the female socket 23 of the light fitting 20. At this stage, the seal 16 may be spaced from the light fitting 20 such that it does not make contact with the base portion 22. In order to form a watertight seal between the lighting apparatus 10 and the base portion 22 of the light fitting 20, the seal 16 of the lighting apparatus 10 is displaced axially toward an outwardly projecting flange 38 (see figures 2 and 4) of the base portion 22 by manually gripping the gripping formations 21 and rotating the seal 16, relative to the inner portion 30, along the external screw-thread formed on the outer surface 13 of the inner portion 30, whilst the rest of the lighting apparatus 10 remains stationary. Although a tool could be used, in this example the seal 16 is displaceable by hand manipulation and turning of the gripping formations 21. The seal 16 is tightened until the seal member 18 sealingly abuts the flange 38 of the base portion 22. In order to remove the lighting apparatus 10 from the light fitting 20, the reverse procedure is followed.

Figure 4 shows an exploded three-dimensional view of the lighting apparatus 10 and the light fitting 20 and illustrates how the different components, including the seal 16, are interconnected.

5 It is to be understood that in different embodiments of the lighting apparatus 10, the diameter of the seal 16 may vary, without departing from the scope of the present invention, in order to accommodate light fittings 20 of varying dimensions. The adjustable peripheral seal 16 is also not limited to the obstruction light application described in this example embodiment and may  
10 find application elsewhere such as in conventional outdoor lighting apparatus.

Owing to the fact that the seal 16 of the lighting apparatus 10 is adjustable with respect to the body 12, the lighting apparatus 10 may be fitted to a number of different light fittings having varying dimensions. The universal  
15 applicability of the lighting apparatus 10 in accordance with the invention eliminates the need for application specific adapters.

Furthermore, the seal 16 may be removed from the body 12 of the lighting apparatus 10 and replaceable with a seal (not illustrated) having a different  
20 diameter, size or rating. In this fashion, one version of the body 12 of the lighting apparatus 10 can be manufactured and used together with a number of different versions of seals 16, making the lighting apparatus 10 readily adaptable to different applications.

**CLAIMS:**

1. An electrical lighting apparatus which is connectable to an electrical light fitting, the lighting apparatus including:

5                   a body defining a body axis;  
                  an electrical connector which projects from the body and is electrically connectable to the light fitting; and  
                  a seal which is connected to, and configured for engagement with, the body such that the seal is displaceable relative to the  
10               body, wherein, when the lighting apparatus is connected to the light fitting, the seal is operatively displaceable relative to the body, along the body axis, between an open position, in which the seal does not abut the light fitting, and a sealed position, in which the seal sealingly abuts the light fitting in order to inhibit  
15               ingress of water and/or dirt into the light fitting.

2. An electrical lighting apparatus as claimed in claim 1, wherein the seal is peripherally connected to the body about the body axis, the seal being axially displaceable relative to the body along the body axis.

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3. An electrical lighting apparatus as claimed in claim 2, in which the seal projects radially outwardly from the body, the seal being circumferentially and axially displaceable relative to the body about the body axis.

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4. An electrical lighting apparatus as claimed in claim 3, wherein the seal is annular and coaxially arranged about the body.

5. An electrical lighting apparatus as claimed in any of the preceding  
30               claims, wherein the seal is screw-threadingly engaged with the body such that the seal is helically/spirally displaceable relative to the body about the body axis.

6. An electrical lighting apparatus as claimed in claim 5, wherein the seal includes:

an attachment formation which is connected to the body; and  
a seal member fast with the attachment formation.

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7. An electrical lighting apparatus as claimed in claim 6, wherein the attachment formation is annular and includes a radially outwardly projecting flange to which the seal member is attached such that the attachment formation is configured operatively to urge the seal member against the light fitting.

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8. An electrical lighting apparatus as claimed in claim 7, in which the attachment formation includes an internal screw-thread and the body includes an external screw-thread such that the attachment formation screw-threadingly engages the body.

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9. An electrical lighting apparatus as claimed in claim 8, wherein the attachment formation includes gripping formations which allow an operator to grip and thus displace the seal relative to the body.

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10. An electrical lighting apparatus as claimed in any of the preceding claims, which includes at least one electrical light source which is electrically connected to the electrical connector.

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11. An electrical lighting apparatus as claimed in claim 10, wherein the electrical light source is in the form of a Light-Emitting Diode (LED), the lighting apparatus further including a light reflector and a heat sink which is thermally connected to the LED.

30

12. An electrical lighting apparatus as claimed in any of the preceding claims in which the electrical connector is a male type electrical connector configured to be received within a female electrical socket of the light fitting.

13. A seal for an electrical lighting apparatus which is connectable to an electrical light fitting, the seal having a central aperture for accommodating a body of the lighting apparatus, the seal being configured for screw-threaded engagement with the body of the lighting apparatus such that, when the lighting apparatus is connected to the light fitting, the seal is operatively displaceable relative to the body of the lighting apparatus between an open position, in which the seal does not abut the light fitting, and a sealed position in which the seal sealingly abuts the light fitting in order to inhibit ingress of water and/or dirt into the light fitting.
14. A seal as claimed in claim 13, which includes an attachment formation which is configured for screw-threaded engagement with the body of the lighting apparatus and a seal member which is attached to the attachment formation.
15. A seal as claimed in claim 14, wherein the attachment formation projects operatively outward away from the lighting apparatus and includes a plurality of gripping formations which allow an operator to grip and rotate the seal relative to the lighting apparatus.

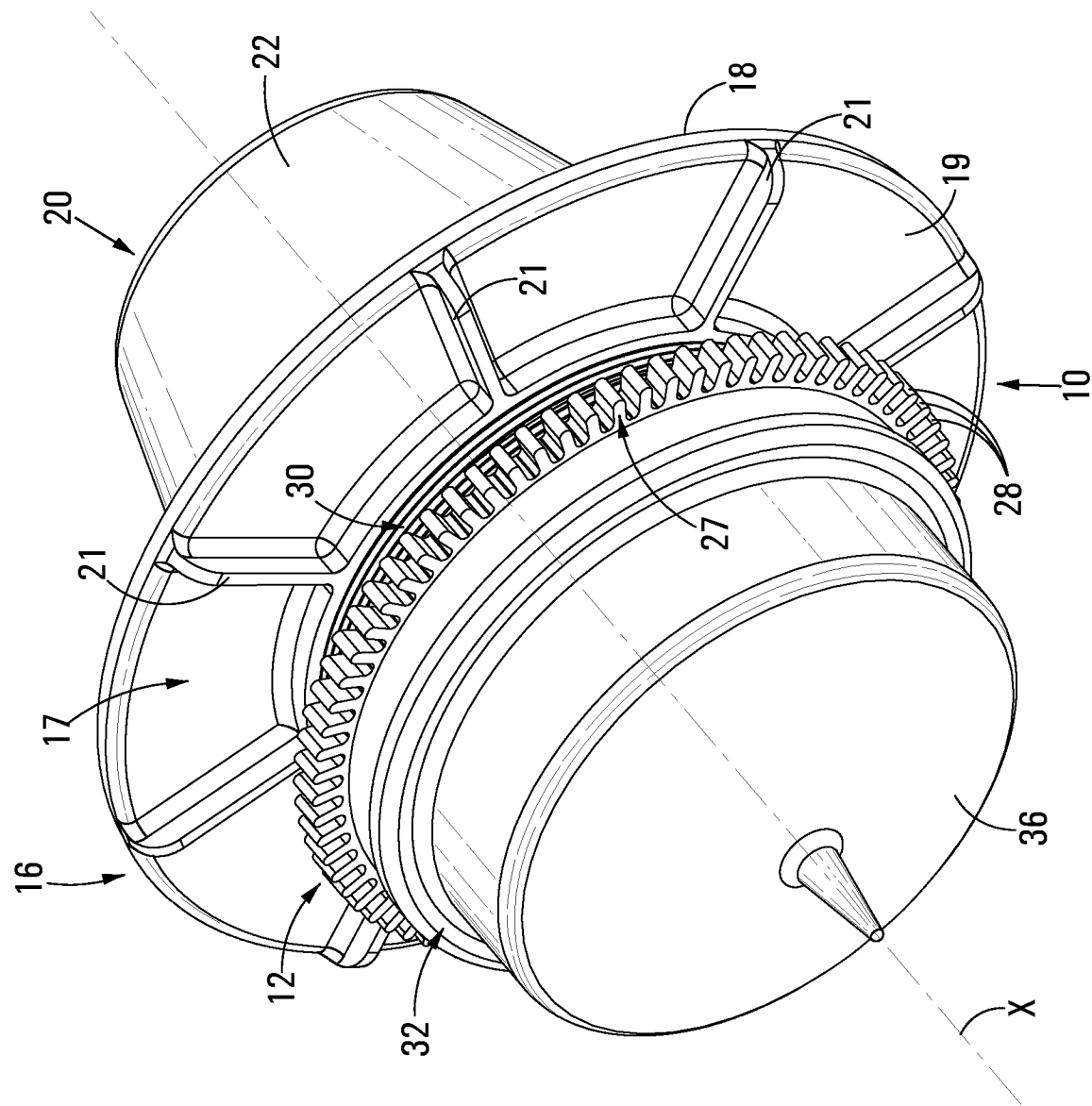
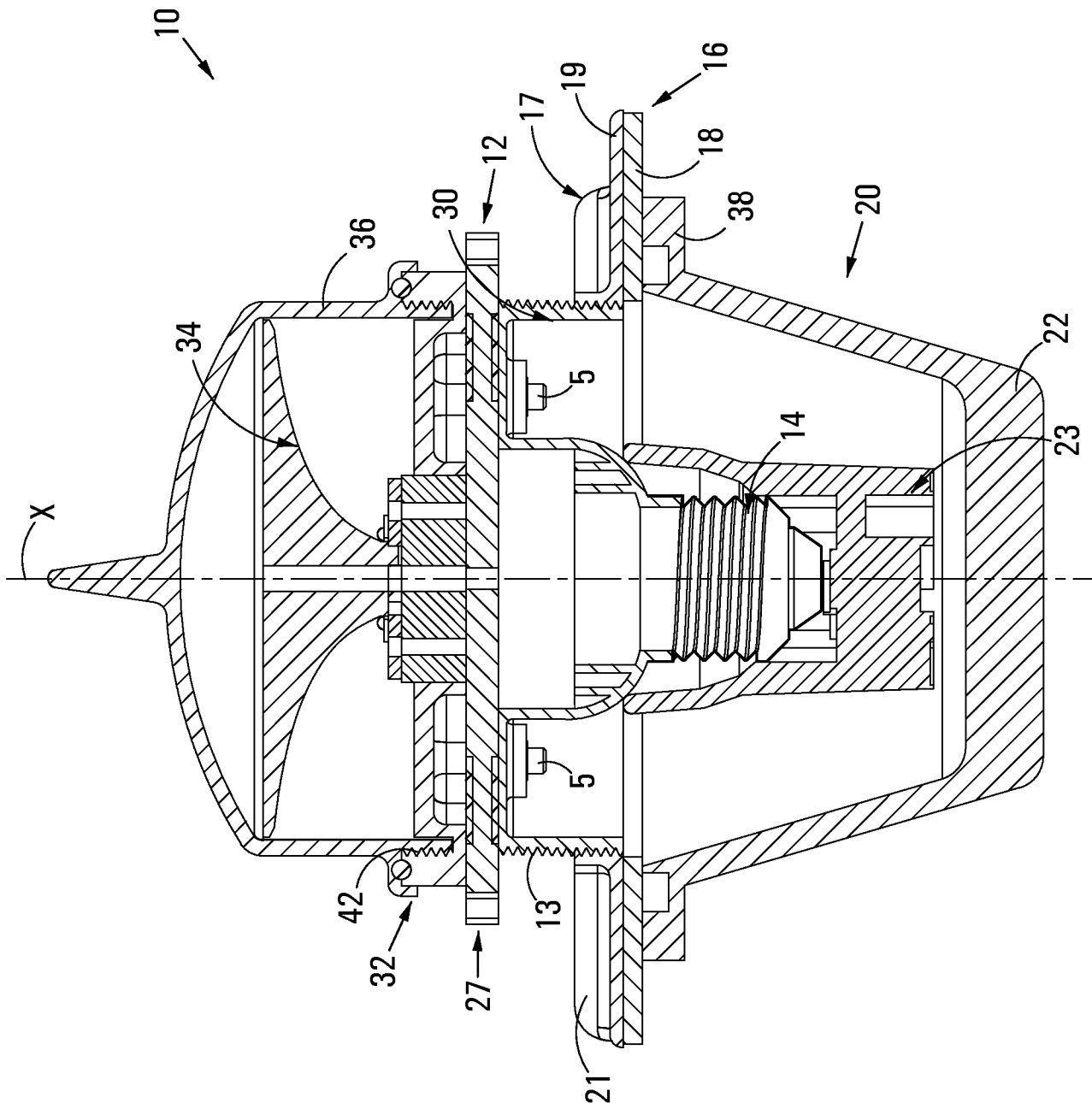
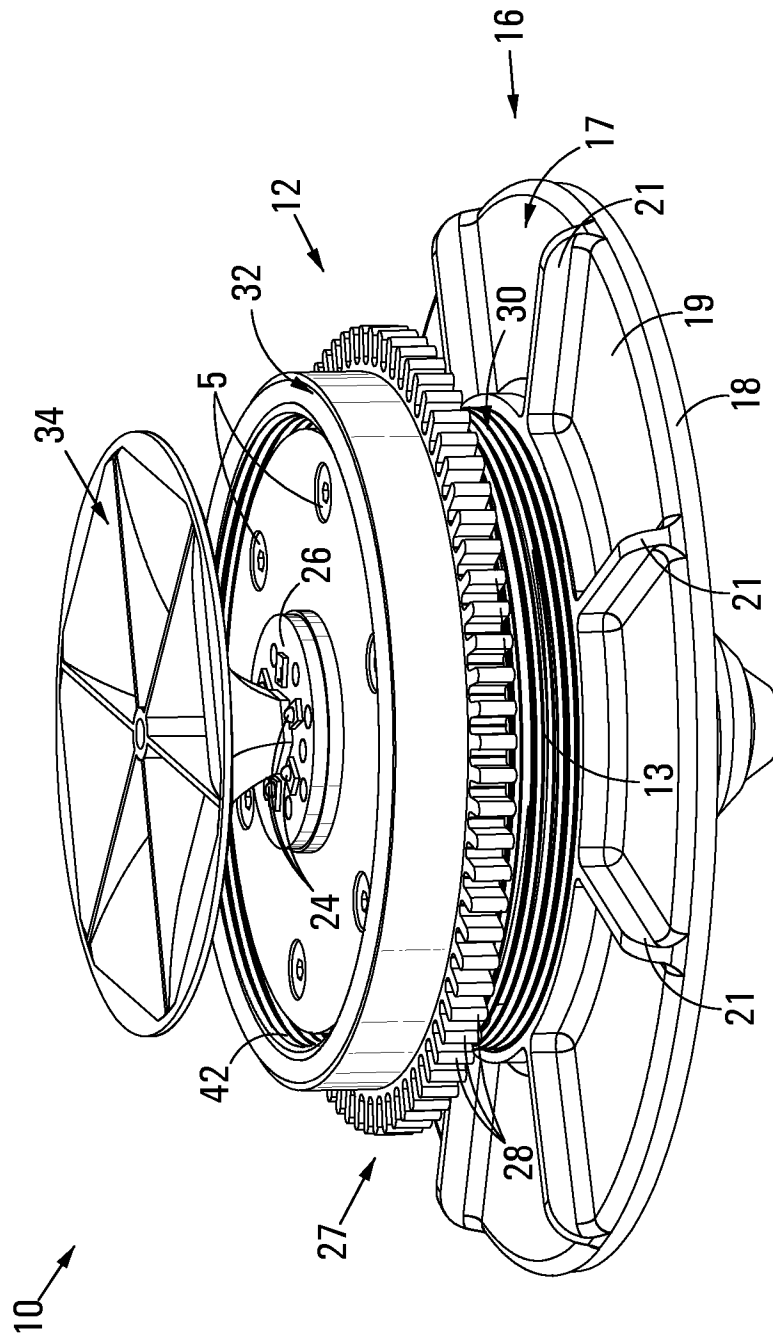


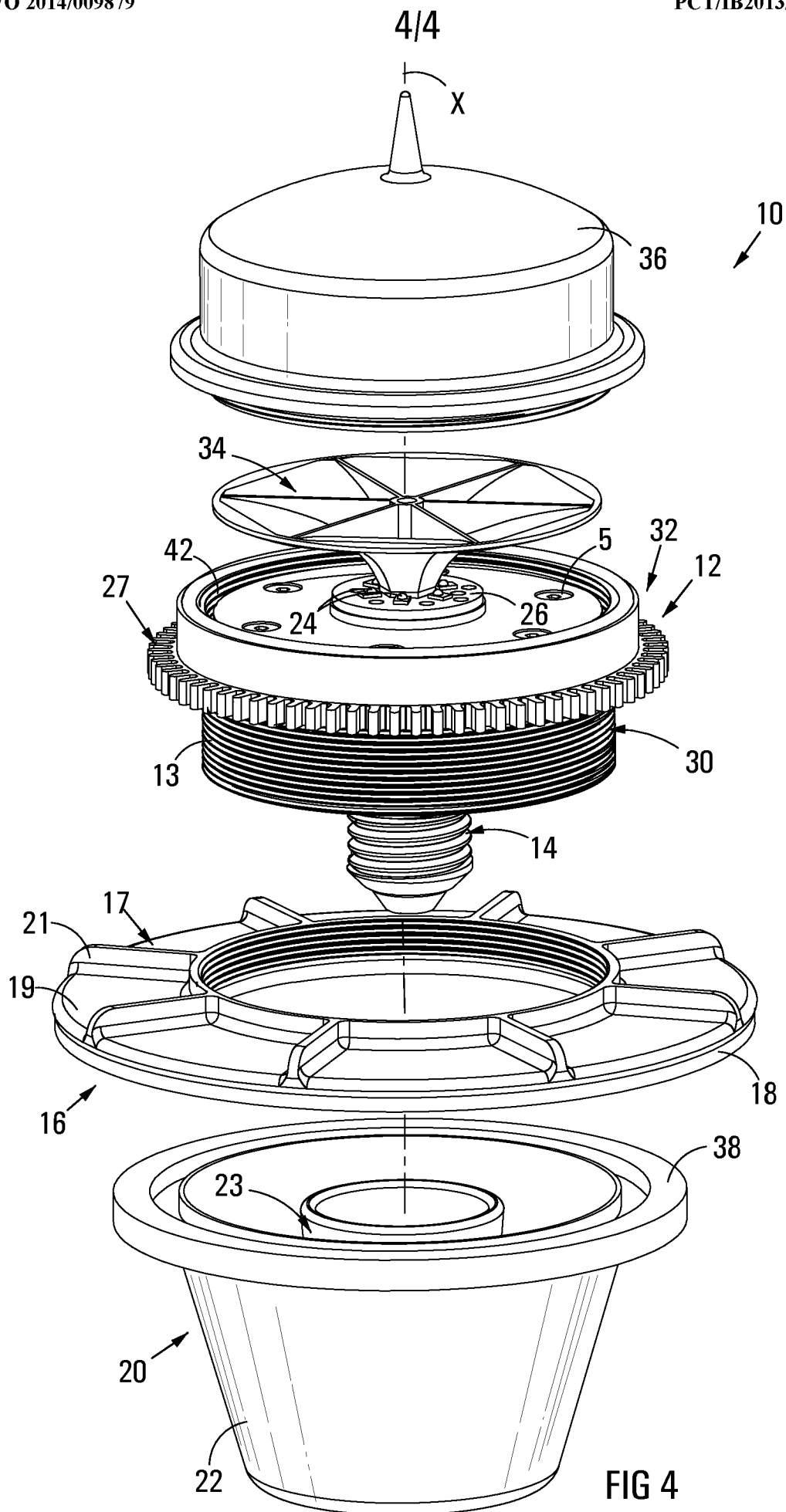
FIG 1



**FIG 2**



**FIG 3**



# INTERNATIONAL SEARCH REPORT

International application No.

PCT / IB 2013/055629

| <b>A. CLASSIFICATION OF SUBJECT MATTER</b><br>IPC: <b>F21V 31/00</b> (2006.01); <b>F21V 15/01</b> (2006.01)<br>According to International Patent Classification (IPC) or to both national classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                    |                                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>B. FIELDS SEARCHED</b><br>Minimum documentation searched (classification system followed by classification symbols)<br>F21V, F21S<br>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                    |                                                                                    |
| Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)<br>EPODOC, WPI, TXTnn                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                    |                                                                                    |
| <b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                    |                                                                                    |
| Category*                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Citation of document, with indication, where appropriate, of the relevant passages                                                                 | Relevant to claim No.                                                              |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | WO 2009103246 A1 (TRI-CONCEPT TECHNOLOGY LIMITED) 27 August 2009 (27.08.2009)<br>Fig. 2, 4, 6a, 6e; paragraphs [53], [55], [79], [83]              | 1, 2, 4-6, 10-12                                                                   |
| Y                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | GB 2489980 A (GREENGAGE LIGHTING LTD) 17 October 2012 (17.10.2012)<br>Fig. 1,2,13; page 2, lines 13-25; page 3, lines 1 and 2; page 10, lines 1-14 | 1, 2, 4-6, 10-12                                                                   |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                    | 13                                                                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | US 6525668 B1 (PETRICK JOHN T) 25 February 2003 (25.02.2003)<br>Column 5, lines 12-50; figures                                                     | 1                                                                                  |
| <input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                    |                                                                                    |
| * Special categories of cited documents:<br>"A" document defining the general state of the art which is not considered to be of particular relevance<br>"E" earlier application or patent but published on or after the international filing date<br>"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)<br>"O" document referring to an oral disclosure, use, exhibition or other means<br>"P" document published prior to the international filing date but later than the priority date claimed<br>"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<br>"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<br>"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<br>"&" document member of the same patent family |                                                                                                                                                    |                                                                                    |
| Date of the actual completion of the international search<br>14 October 2013 (14.10.2013)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                    | Date of mailing of the international search report<br>23 October 2013 (23.10.2013) |
| Name and mailing address of the ISA/AT<br>Austrian Patent Office<br>Dresdner Straße 87, A-1200 Vienna<br>Facsimile No. +43 / 1 / 534 24-535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                    | Authorized officer<br>VELINSKY-HUBER I.<br>Telephone No. +43 / 1 / 534 24-371      |

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.

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