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(54) **Recessed mounting box with locking ring**

(57) A mounting system for mounting light source inserts in plate-shaped elements, wherein the system comprises:
- a (rotationally symmetric) box for recessed mounting, the box having a bottom surrounded by a continuous wall provided with an area in the vicinity of the lower free edge in the condition of use, the area suited for fastening
- a locking element including a number of bent flexible tabs which are distributed externally along the outer periphery, where a radially outwardly projecting point is provided on at least one tab and where an annular groove is provided under the tabs, in which groove a flexible O-ring is provided.

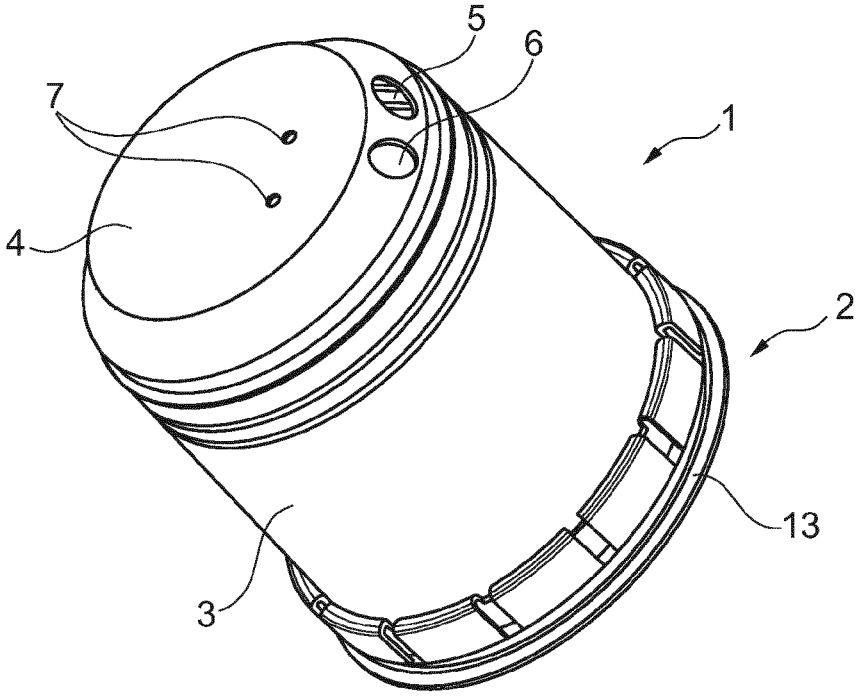

Fig. 1

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Description

Field of the Invention

[0001] The present invention concerns a mounting system for mounting light source inserts in plate-shaped elements.

Background of the Invention

[0002] Built-in spots are often used as lighting, typically incorporated in e.g. a suspended ceiling by means of a mounting box such that at the back side of the ceiling the required electric wires are led to the box, and in the box itself is provided a suitable socket for the light source intended to be used in connection with the spot, as well as there will be additional means in the form of e.g. a bezel for mounting around the mounted spot such as to aesthetically form part of the suspended ceiling or other plate material into which a spot is desired to be incorporated.

[0003] There exist a large number of different spots for recessed mounting that more or less satisfy various needs, but it applies for all these spots that they require a mounting hole which is considerably larger than the diameter of the spot itself such that a leakage arises between the plate element and the mounted spot. A number of different systems have been developed in order to seal this leakage, but obviously it would be desirable with a solution where the recessed spot can be mounted without the hole in the plate element being larger than the outer diameter of the recessed mounting box.

[0004] Besides the recessed mounting box with associated socket, wire etc. there are a number of recessed mounting boxes in which the other electronic components are to be provided, as e.g. a transformer, such that e.g. 220V is transformed to 12V for use with halogen and LED light sources. These transformers are in many cases mounted in connection with each single spot and are thus to be mounted up through the hole provided in the plate-shaped element as well.

[0005] For retaining the recessed spots, typically there is applied spring elements provided at the external side of the recessed spot such that when the spot is correctly positioned, these spring elements will press against the back side of the plate-shaped element, thereby securing the recessedly mounted spot in correct position relative to the hole. These springs or other resilient elements of course require a certain excessive size of the hole so they can pass through the plate-shaped element.

Object of the Invention

[0006] The purpose of the present invention is thus to provide a mounting system which avoids the above mentioned inexpediencies and provides further advantages in connection with mounting of light source inserts.

[0007] The invention provides for this by a mounting system for mounting light source inserts in plate-shaped elements, wherein the system comprises:

- a box for recessed mounting, the box having a bottom surrounded by a continuous wall provided with an area in the vicinity of the lower free edge of the wall in the condition of use, the area suited for fastening
- a locking element including a number of bent flexible tabs which are distributed externally along the outer periphery, and where a radially outwardly projecting point is provided on at least one tab.

[0008] Since the locking element is equipped with at least one tab with a radially outward directed point, the locking element will be retained by the radial point or points when placed in the pre-drilled hole in the plate-shaped element. The locking element will typically be pre-mounted on the recessed mounting box itself such that it is the outer diameter of the locking element which will be dimensionally determining for the hole to be provided in the plate-shaped element. When the recessed mounting box with attached locking element is inserted in the hole, the locking element will efficiently seal along the periphery of the pre-drilled hole such that the points on the locking element provide a friction by which the recessed mounting box is secured relative to the plate-shaped element. The flexible tabs will typically be slightly compressed during mounting, and due to the flexible construction of the locking element this compression will exert a radial force on the pre-drilled hole, whereby the recessed mounting box is secured in a better way.

[0009] In a further preferred embodiment, at the upper end in the condition of use, the wall of the box is provided with a screw thread, and that the bottom of the box is provided with a corresponding screw thread such that the bottom can be releasably fastened to the wall.

[0010] The design of this recessed mounting box differs from the above mentioned example where wall and end piece are either one element or two conjoined elements in that the bottom of the box is a separate element relative to the wall of the recessed mounting box and thereby that it is possible to mount different bottoms with different properties. For example, it may envisaged that means for ventilation, either passive or active ventilation, are provided at the bottom, and various fastening means for securing light source sockets etc. can also be arranged at the bottom of the box. In that way the recessed mounting box itself with associated locking element becomes usable for a large number of different light sources and light source designs such that an almost universal recessed mounting box is provided.

[0011] In a further preferred embodiment of the invention, the upper end in the condition of use, the wall of the box is provided with a screw thread and the bottom of the box is provided with a corresponding screw thread, and one or more intermediate pieces are similarly provided with a corresponding screw thread such that the

intermediate pieces and the bottom can be releasably fastened to the wall of the box and/or to one or more intermediate pieces, respectively.

[0012] This variant of the invention entails that several pipe sections can be joined by means of the screw thread such that the recessed mounting box can be adapted in height for the desired task. This may e.g. be advantageous if desiring to incorporate a thermal protection or by very elongated designs in connection with the used light source as well as possible electronics can be mounted within the box in contrast to at the back side of the plate-shaped element, possibly in connection with the side of the recessed mounting box or elements fastened to the side of the recessed mounting box as indicated in the previously published applications EP 2157370 and US 7607935 by the applicant.

[0013] In a further preferred embodiment of the invention, the locking element is fastened to the recessed mounting box by means of screws or bolts or rivets, or a stud is provided in the box or the locking element, and where a corresponding hole is provided in the other element such that the stud can be retained in the hole, or the locking element is glued to the box, or the locking element is made as an integrated part of the recessed mounting box.

[0014] Since the locking element will typically be applied to the recessed mounting box before mounting, various methods of fastening the locking element can be used. Particularly advantageous is the use of Allen screws or similar screws which are screwed from the inside of the recessed mounting box as hereby it becomes possible to tighten these screws more following mounting whereby the locking ring is mechanically pressed outwards against the periphery of the hole in the plate-shaped element in which the recessed mounting spot is to be mounted.

[0015] The invention further envisages that the locking element can be an integrated part of the recessed mounting box such that the lower edge of the recessed mounting box is bent in order thereby to provide the desired profile such that the mounting instruction described above is met by the design of the profile.

[0016] In a further embodiment of the invention the locking element includes means for retaining/mounting wires, ventilation tubes, electric or electronic components.

[0017] This is already mentioned above in connection with the possibility of joining several tubular elements to a recessed mounting box having substantially greater height as hereby it becomes possible to provide space for these components.

[0018] In a further preferred embodiment of the invention, the mounting system is characterised in that the locking element is provided with an annular groove under the tabs, and that a resilient O-ring is provided in the annular groove, and that a radially outwardly projecting flange is formed under the annular groove, the flange disposed largely perpendicular to the wall of the recessed mounting box.

[0019] The O-ring serves as a seal between the plate-shaped element and the recessed mounting box such that no leakage arises here. In connection with modem building constructions it is required that the building as such is to have very comprehensive tightness, and since a large number of recessed spots are typically applied, leaks around the recessed spots will totally entail a substantial leakage in the construction, why it is advisable to be very careful with sealing of the recessed mounting box itself. Leakages typically arise in connection with penetration of the vapour barrier and following inadequate repair/sealing. This can of course be avoided if using a recessed mounting box according to the present invention as the recessed mounting box can be mounted in a hole fitting the outer diameter of the box since an additional hole size does not have to be provided for passage of transformer and other electronic equipment, or if retaining springs etc., which are also to pass the mounting hole in the plate-shaped element, are mounted externally of the recessed mounting box. In that connection, the invention therefore has a substantial advantage compared with prior art recessed spots as it is possible mount all parts of the recessed spot in a hole with maximum diameter of the recessed spot itself. Before mounting, the vapour barrier can be sealed effectively against the plate-shaped element, against which the recessed mounting box is also effectively sealed.

[0020] The invention furthermore includes a locking element per se as the locking element obviously can be used in connection with other installation and recessed mounting boxes.

Description of the Drawing

[0021] The invention will now be explained more closely with reference to the accompanying drawing where:

- Fig. 1 illustrates an assembled mounting system;
- Fig. 2 illustrates the locking element;
- Fig. 3 shows a cross-section through the locking element;
- Fig. 4 illustrates recessed mounting box without bottom;
- Fig. 5 illustrates a cross-section through a mounting system as illustrated in Fig. 1;
- Fig. 6 illustrates the design of another locking element.

Detailed Description of Embodiments of the Invention

[0022] In Fig. 1 is illustrated a complete mounting system 1 including a locking element 2 oriented in the lower end of the wall of the recessed mounting box 3 where a lid 4 is screwed on the opposite end. By means of screw threads in the wall 3 of the recessed mounting box and in the lid 4, respectively, the lid is provided such that the

recessed mounting box 3 and the lid 4 can easily be joined. This provides the option that other lids 4 can be mounted where the other lids have other properties, dimensions, or differ from the lid illustrated in Fig. 1 in other ways.

[0023] In this version, the lid 4 is equipped with two holes 5, 6 which are typically used for lead-in of wires and the like. Besides, one hole, e.g. hole 6, can be used for venting such that the heat typically generated by the light sources can escape from the recessed mounting box.

[0024] Moreover, in the lid there is provided additional two minor holes 7 which are typically used for fastening further components, e.g. a transformer or a double hinge for mounting a transformer as indicated in the previous application EP 2157370 by the same applicant.

[0025] The locking element illustrated in Fig. 2 includes a largely ring-shaped element on which is provided a number of tabs 8. The tabs are slightly resilient such that when the mounting box as illustrated in Fig. 1 is inserted in a pre-drilled hole in a plate element, the tabs will be slightly bent and thereby exert a pressure against the periphery of the hole whereby the mounting system is secured in the pre-drilled hole. An annular groove 9 and a number of holes 10 are provided internally of the locking element 2. The holes 10 serve as fastening of the locking ring to the wall of the recessed mounting box itself as illustrated in Fig. 5. The annular groove provides for stepless setting of the recessed mounting box in relation to the locking ring, whereby the box can be adjusted independently of the locking ring, and the element in which the box is mounted is consequently adapted.

[0026] The locking ring is externally provided with a groove 11 which is downwardly limited by a flange 12 such that an O-ring 13, see Fig. 1, can be arranged and retained in the groove 11 during and after mounting. The O-ring 13, see Fig. 1, serves as sealing between the drilled hole in the plate-shaped element and the locking ring such that the greatest possible tightness between the two parts is achieved.

[0027] Fig. 4 illustrates the wall 3 of the recessed mounting box where along a lower free edge in the condition of use there is provided a hole 10' such that the wall 3 of the recessed mounting box can be joined with the locking element 2, e.g. by means of Allen screws as illustrated with reference to Fig. 5.

[0028] The locking element 2 can obviously be joined with the wall in many other ways, e.g. by glue, bolts, rivets or similar, as well as the locking element can be an integrated part of the wall itself such that the lower part of the wall is bent and then formed to the properties possessed by the locking element.

[0029] In Fig. 5 is shown a cross-section through an assembled box as illustrated in Fig. 1 where it is clearly seen that the lid 4 is fastened to the wall of the recessed mounting box 3 by means of a screw thread 16. The locking element 2 is correspondingly fastened to the wall 3 of the recessed mounting box by means of Allen screws 15 that are accessible from the inside/below such that the box after mounting can be further secured in the hole provided in the plate-shaped element. The flange 12 will cover the gap between the opening 20 of the recessed mounting box and the plate-shaped element (not shown) in which the recessed mounting box is fitted.

[0030] In Fig. 6 is illustrated a locking element 2' where two holding means 22 are provided projecting upwards from the locking element 2' itself. The holding means 22 are examples of how other means can be joined with the installation box by means of the locking element.

[0031] In the actual illustrated example the holding means 22 serve to retain a flexible rubber tube on the wall of the recessed mounting box such that the tube is not secured by the box but by the holding means 22.

Claims

1. A mounting system for mounting light source inserts in plate-shaped elements, wherein the system comprises:

   - a box for recessed mounting, the box having a bottom surrounded by a continuous wall provided with an area in the vicinity of the lower free edge in the condition of use, the area suited for fastening
   - a locking element including a number of bent flexible tabs which are distributed externally along the outer periphery, and where a radially outwardly projecting point is provided on at least one tab.

2. A mounting system according to claim 1, **characterised in that** in the upper end in the condition of use, the wall of the box is provided with a screw thread, and that the bottom of the box is provided with a corresponding screw thread such that the bottom can be releasably fastened to the wall.

3. A mounting system according to claim 1 or 2, **characterised in that** at the upper end in the condition of use, the wall of the box is provided with a screw thread, and that the bottom of the box is provided with a corresponding screw thread, and that one or more intermediate pieces are similarly provided with a corresponding screw thread such that the intermediate pieces and the bottom can be releasably fastened to the wall of the box and/or to one or more intermediate pieces, respectively.

4. A mounting system according to claim 1, **characterised in that** the locking element is fastened to the recessed mounting box by means of screws or bolts or rivets, or that a stud is provided in the box or the locking element, and that a corresponding hole is provided in the other element such that the stud can

be retained in the hole, or that the locking element is glued to the box, or that the locking element is made as an integrated part of the recessed mounting box.

5. A mounting system according to one or more preceding claims, **characterised in that** the locking element includes means for retaining/mounting wires, ventilation tubes, electric or electronic components.

6. A mounting system according to one or more preceding claims, **characterised in that** under the tabs the locking element is provided with an annular groove, that a resilient O-ring is provided in the annular groove, and that a radially outwardly projecting flange is formed under the annular groove, the flange disposed largely perpendicular to the wall of the recessed mounting box.

7. A locking element for use in fastening recessed mounting boxes and installation boxes, the locking element including a largely annular element on which a number of bent flexible tabs are distributed externally along the outer periphery of the annular element, and where on at least one tab there is provided a radially outwardly directed point, and where the locking element contains means for fastening the locking element to a recessed mounting box and/or an installation box.

8. A locking element according to claim 7, **characterised in that** the locking element is fastened to the recessed mounting box by means of screws or bolts or rivets, or that a stud is provided in the locking element, and that a corresponding hole is provided in the recessed mounting box or the installation box such that the stud can be retained in the hole, or that the locking element is glued to the box.

9. A locking element according to claim 7 or 8, **characterised in that** the locking element includes means for retaining/mounting wires, ventilation tubes, electric or electronic components.

10. A locking element according to one or more of claims 7 to 9, **characterised in that** the locking element is provided with an annular groove under the tabs, and that a resilient O-ring is provided in the annular groove, and that a radially outwardly projecting flange is formed under the annular groove, the flange disposed largely perpendicular to the wall of the recessed mounting box.

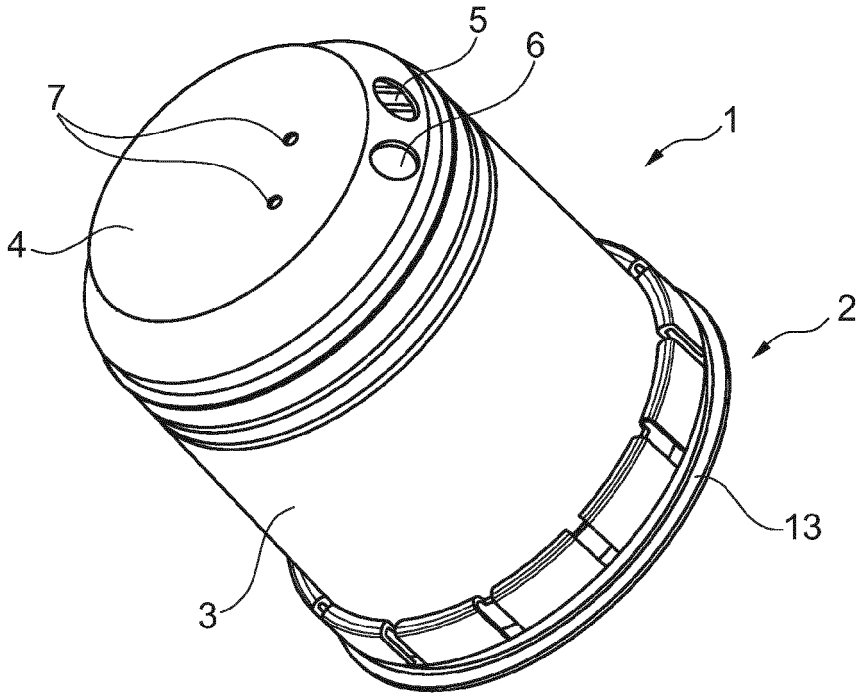

Fig. 1

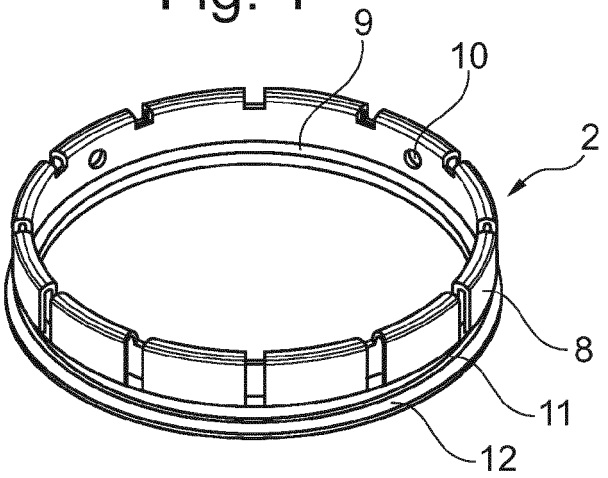

Fig. 2

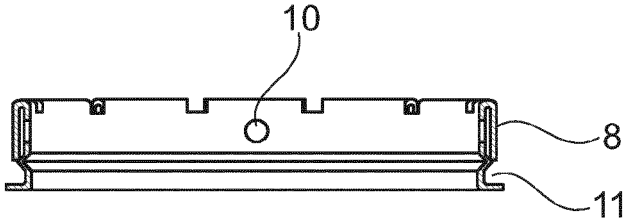

Fig. 3

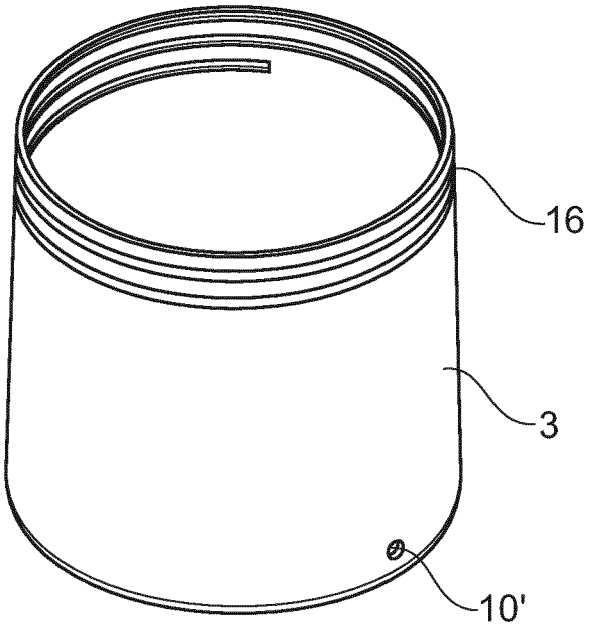

Fig. 4

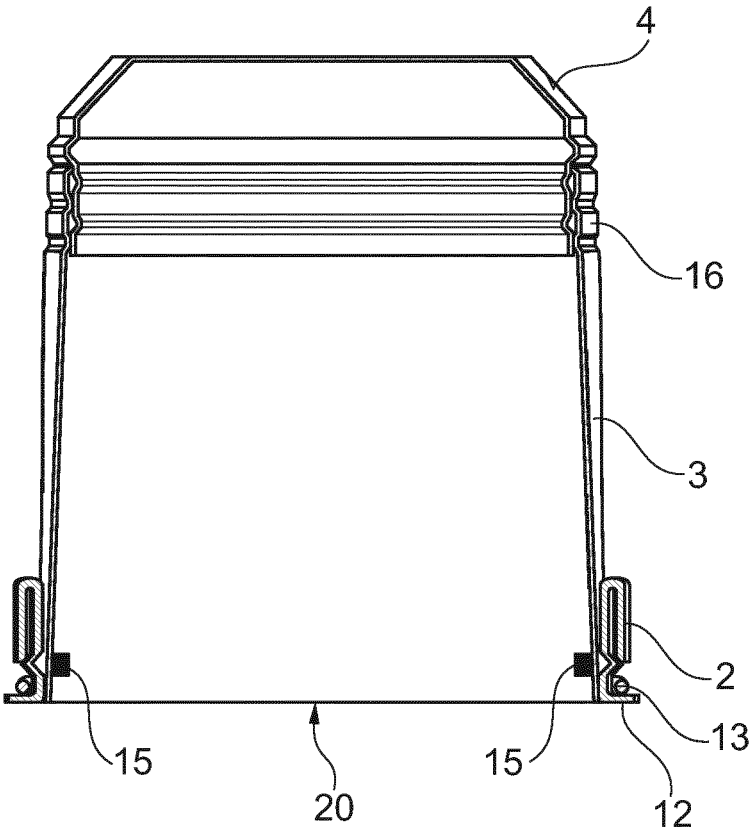

Fig. 5

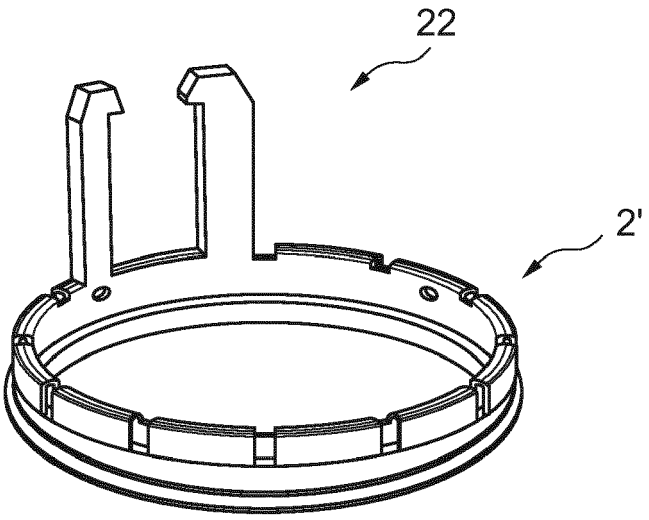

Fig. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 12 16 4094

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 253 881 A1 (SHARP KK [JP]) 24 November 2010 (2010-11-24)	1,4,7,8	INV. F21V21/04
A	* paragraph [0032] - paragraph [0080]; figures *	2,6,10	
X	US 2005/225966 A1 (HARTMANN RICHARD JR [US] ET AL HARTMANN JR RICHARD [US] ET AL) 13 October 2005 (2005-10-13)	1,4,7,8	
A	* abstract; figures 1-27 * * paragraph [0041] - paragraph [0093] *	2,6,10	
X	US 4 475 147 A (KRISTOFEK PAUL J [US]) 2 October 1984 (1984-10-02)	1,7	
A	* figures * * column 1, line 38 - column 5, line 5 *	2,4,6,8,10	
X	GB 2 359 848 A (ILLUMA LIGHTING LTD [GB]) 5 September 2001 (2001-09-05)	1,7	
A	* figures * * page 1, line 1 - page 4 *	2,4,6,8,10	
X,D	EP 2 157 370 A2 (DAXTOR APS [DK]) 24 February 2010 (2010-02-24)	1,7	TECHNICAL FIELDS SEARCHED (IPC) F21V
A	* abstract; figures * * paragraph [0029] - paragraph [0040] *	2,4,6,8,10	
A	FR 2 617 946 A1 (PERCHE ETS [FR]) 13 January 1989 (1989-01-13) * claims; figures *	1,7	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 September 2012	D'Sylva, Christophe

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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20-09-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2253881 A1	24-11-2010	CN 101960215 A	26-01-2011
		EP 2253881 A1	24-11-2010
		JP 4558053 B2	06-10-2010
		JP 2009218007 A	24-09-2009
		KR 20100126792 A	02-12-2010
		US 2011002115 A1	06-01-2011
		WO 2009110336 A1	11-09-2009
US 2005225966 A1	13-10-2005	US 2005225966 A1	13-10-2005
		US 2008212330 A1	04-09-2008
US 4475147 A	02-10-1984	NONE	
GB 2359848 A	05-09-2001	NONE	
EP 2157370 A2	24-02-2010	AT 545828 T	15-03-2012
		DK 2157370 T3	29-05-2012
		DK 201000167 U1	24-09-2010
		EP 2157370 A2	24-02-2010
FR 2617946 A1	13-01-1989	NONE	

EPO FORM P0459

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 2157370 A **[0012] [0024]**
- US 7607935 B **[0012]**