



(11) **EP 1 746 342 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
24.01.2007 Bulletin 2007/04

(51) Int Cl.:
F21V 31/04 ^(2006.01)

(21) Application number: **06116537.9**

(22) Date of filing: **04.07.2006**

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**
Designated Extension States:
AL BA HR MK YU

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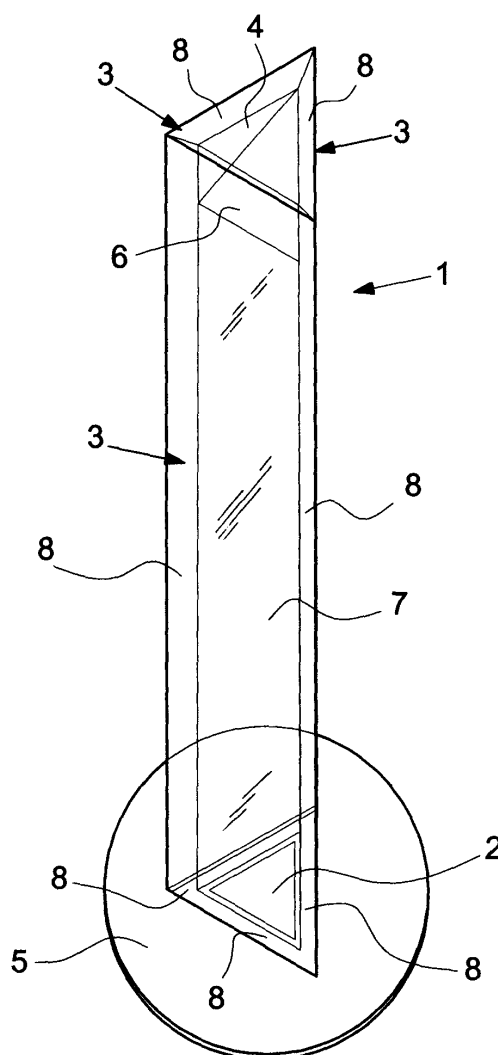
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(30) Priority: **21.07.2005 IT MI20051399**

(54) **Lighting appliance filled with an anhydrous and inert gas**

(57) Lighting appliance (1) of the type consisting of a housing and protective structure of at least one light source (2), comprising at least one wall (3) made of a material which is transparent or semi-transparent to light, and which defines an internal space (7), filled with an anhydrous and inert gas and substantially isolated from the outside.



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Description

[0001] The present invention relates to a lighting appliance not subject to the formation of condensate and the development of life forms in its interior.

[0002] In particular, the present invention proposes the production of lighting appliances in whose interior, in the seat which houses the light source, there is an inert environment, capable of preventing the formation of condensate on the walls and the development of vegetal or animal life forms such as mildew, moss, bacteria or insects.

[0003] It is known that, in lighting appliances having a structure which forms a housing seat for the light source, said housing seat being surrounded by at least one wall made of glass or other light transparent material, there is frequently the formation of condensate on the walls, as a result of a thermal unbalance between the outside environment and the interior of the appliance.

[0004] This phenomenon is due to the fact that there is always a certain percentage of water in suspension in the atmospheric air, which forms what is commonly called humidity. Every time the light source is switched on, developing heat, the temperature of the air inside the lighting appliance increases. The walls of the appliance, in contact with the outside air, however, maintain a lower temperature. As a result of the development of heat inside the lighting appliance, the water in suspension in the air contained inside the appliance itself evaporates and, when it comes into contact with the walls having a lower temperature, it condenses on their surface, creating the phenomenon commonly known as misting.

[0005] In particular, the deposit of condensate on the reflecting walls possibly present inside the lighting appliance creates a reduction in their reflecting capacity, whereas the misting on the transparent surfaces of the lighting appliance causes a loss in transparency itself.

[0006] It is also known that another problem of most lighting appliances, in particular those for external use, consists of the development inside the appliance of aerobic life forms of a vegetal and/or animal nature. This type of problem is particularly due to the environment inside the lighting appliances, which is generally favourable to the development of these life forms, as a result of its characteristics of luminosity, humidity and temperature.

[0007] If the problem of the development of animal and/or vegetal life forms inside lighting appliances can be overcome by air-sealing the appliances themselves, after inserting in their interior air not contaminated by these life forms, thus preventing their subsequent access inside the lighting appliances, the problem of the formation of condensate is by no means solved with this type of solution.

[0008] Furthermore, bearing in mind that the water vapour pressure has a non-linear behaviour, very rapidly increasing with an increase in temperature, the air-sealing of the lighting appliance, in which air with a certain

degree of humidity (i.e. water in suspension) is contained, can cause an undesired increase in pressure inside the device. This phenomenon can be ignored in structures in which there are ample thermal exchange surfaces, but becomes considerably important for lighting appliances having modest volumes and surfaces (such as appliques, for example), in which the dissipation of heat by conduction and convection is greatly limited by the modest surfaces exposed to ventilation. Pressure variations inside the lighting appliance consequently cause considerable stress not only on the structure of the lighting appliance (which must therefore be dimensioned), but also on the welding surfaces and in particular on the adhesives used for sealing the device.

[0009] Contrary to what is envisaged for preventing the development of life forms inside the lighting appliance, these drawbacks would therefore require the passage of air between the interior and outside of the appliance. A rather consistent passage of air could also prevent the problem of the formation of condensate inside the lighting appliance, allowing a temperature equilibrium to be established between the inside and outside of the lighting appliance itself.

[0010] The present invention proposes a solution capable of contemporaneously overcoming problems linked to the development of vegetal and/or animal life forms inside the appliance, avoiding the formation of condensate on the surfaces of the appliance and considerably limiting the problem of overpressures.

[0011] A main objective of the present invention is therefore to provide a lighting appliance whose structure forms a housing seat of at least one light source, said housing seat being surrounded by at least one wall made of glass or another light transparent material, wherein the above problems have been eliminated.

[0012] A further objective of the present invention is to provide a lighting appliance which maintains its efficiency and lighting capacity with time, without requiring frequent maintenance interventions.

[0013] These objectives according to the present invention are achieved by providing a light appliance which has the characteristics specified in claim 1.

[0014] Further characteristics of the lighting device of the present invention are indicated in the subsequent dependent claims.

[0015] The characteristics and advantages of a lighting appliance according to the present invention will appear more evident from the following illustrative and non-limiting description, referring to the enclosed schematic drawing which shows a lighting appliance equipped with a structure with transparent walls which define a volume inside which a light source is housed.

[0016] With reference to the figure, the lighting device 1 consists of a light source 2, situated at the base of the lighting appliance 1, the structure of the lighting appliance 1 consisting of three side walls 3 and an upper wall 4, said walls all being made with a transparent material. The lighting device 1 rests with its side walls 3 on a base

5. Inside the lighting appliance 1 there is a reflecting surface 6, which has the function of reflecting the beam of light, which would otherwise be dispersed upwards, in the direction considered most consonant.

[0017] The side walls 3, the upper wall 4 and the base 5 define an internal space 7.

[0018] It is evident that, due to the amplitude of the transparent side walls 3 and position of the light source 2, the lighting appliance is particularly negatively influenced by the formation of condensate on the side walls 3. In particular, the formation of condensate on the reflecting surface 6 causes a reduction in its reflecting capacity, whereas the misting of the transparent surfaces of the side walls 3 causes a loss in their transparency and consequently an impoverishment of the lighting capacity of the lighting appliance 1.

[0019] Creating and maintaining an inert atmosphere inside the lighting appliance 1 is particularly advantageous in this case.

[0020] In order to obtain this objective, the present invention proposes filling the internal space 7 of the lighting device 1 with an inert and anhydrous gas 7. Furthermore, to prevent air and/or water (in the liquid state or as vapour) from subsequently entering the internal space (7) of the appliance, the edges of the internal space (7) are sealed with strips (8) of sealing adhesive, situated on the contact surfaces between the different components of the structure of the lighting appliance (1).

[0021] The inertia characteristics of the gas which fills the internal space of the lighting device 1, prevent the development of vegetal and/or animal life forms inside the lighting appliance. Furthermore, the absence of water also prevents the possibility of the formation of condensate on the wall and the creation of overpressures.

[0022] For the filling and possible reintegration of the anhydrous and inert gas inside the lighting appliance 1, the lighting appliance 1 is equipped with at least one valve element, through which the reintegrating gaseous stream is passed. This expedient is also necessary in cases in which it is not possible to ensure the perfect airtight-sealing of the lighting appliance 1, but the prevention of the development of life forms and condensate its interior is required.

[0023] Gases which can be preferably used according to the present invention are nitrogen and argon. Nitrogen represents the most economically convenient solution (it can be obtained from the air by means of a fractionated distillation process), and is particularly suitable for preventing the development of aerobic life forms. Although argon is more expensive, it also prevents the development of anaerobic life forms, as well as guaranteeing a perfect non-interaction with the adhesives used for the sealing.

[0024] The lighting appliance, object of the present invention, has the advantage of providing an effective solution to the problems to be solved and of contemporaneously solving all problems relating to the development of life forms inside the lighting appliance 1, the formation

of condensate on its surfaces, and also overpressures.

[0025] Furthermore, the lighting appliance 1 according to the present invention maintains its lighting capacity with time, requiring sporadic and simple maintenance interventions.

[0026] Finally, the lighting appliance according to the present invention provides a solution which is easy and economical to effect and manage.

[0027] The present invention is described for illustrative and non-limiting purposes, according to one of its preferred embodiments, variations and/or modifications however can obviously be applied by experts in the field, all included in the relative protection scope, as defined in the enclosed claims.

[0028] In particular, the forms, as also the materials, of the lighting appliance of the invention can differ from those shown for illustrative but non-limiting purposes in the figure.

Claims

1. A lighting appliance (1) of the type consisting of a housing and protective structure of at least one light source (2), comprising at least one wall (3) made of a material which is transparent or semi-transparent to light, and which defines an internal space (7), **characterized in that** said internal space (7) is filled with an anhydrous and inert gas and that said internal space (7) is substantially isolated from the outside.
2. The lighting appliance (1) according to claim 1, **characterized in that** said internal space (7) is isolated from the outside by means of an airtight seal.
3. The lighting appliance (1) according to claim 2, **characterized in that** said airtight seal is obtained with sealing adhesives.
4. The lighting appliance according to claim 1, **characterized in that** said anhydrous and inert gas is inserted or reintegrated in the internal space (7) of the lighting device (1) by means of valve elements.
5. The lighting appliance according to claim 1, **characterized in that** said anhydrous and inert gas is selected from nitrogen, argon or mixtures thereof.

