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Remarks:

A request for correction of claim 1 has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(54) Heat shielded fluorescent lamp

(57) A heat shielded fluorescent lamp, consisting of lamp tube (1), ballast (2), ballast housing (3) and standard lamp base (4), characterized in that the lamp tube (1) is covered by a transparent or translucent envelope (5), the cavity inside the envelope (5) under a vacuum, and the envelope (5) is sealed and tightly fixed onto the lamp ballast whereas the air pressure inside the envelope (5) is below 100 mHg. The invented fluorescent lamp can separate itself from the heat outside, and can therefore produce higher light output under normal temperature as well as under low temperature.

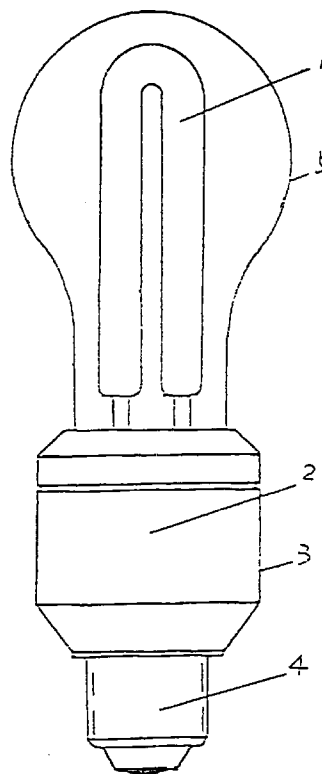


Fig. 1

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Description

The present invention relates to a kind of compact low-pressure discharge fluorescent lamp, and more particularly to a kind of heat shielded energy saving compact fluorescent lamp.

When an energy saving fluorescent lamp is working, different area of the lamp tube surface will have different temperature. The area with the lowest temperature is called cold spot. The cold spot temperature has an optimum value under which a fluorescent lamp can produce the highest light output. When the surrounding temperature is very low, e.g. below 0° C, the fluorescent lamp produces very low light output, or even fails to function. The US Patent No. 4,853,591 mentioned a kind of energy saving lamp having a shortcoming of not working properly under low temperature.

In view of the above shortcoming of the present energy saving fluorescent lamp, this invention aims at providing a kind of heat shielded fluorescent lamp that can work not only under normal temperature but also under extremely low temperature and obtains a satisfactory light output.

In order to achieve this goal, the invention provides a kind of heat shielded fluorescent lamp that consists of a lamp tube, electronic ballast, ballast housing, standard lamp base, and an envelope covering the lamp tube. The invented fluorescent lamp is characterized in that the lamp tube is put totally covered by a transparent or translucent envelope whereas the cavity inside the envelope is vacuum. The envelope is sealed and being fixed onto the ballast housing. The air pressure inside the envelope is below 100 mmHg.

The attached figures will further illustrate the characteristics and application of this new invention:

Fig. 1 shows the front view of the application of the invented heat shielded fluorescent lamp.

Fig. 2a - 2g show the different envelope shapes of the invented lamp.

Fig. 1 illustrates the application of the invented heat-shielded fluorescent lamp. It consists of lamp tube (1), ballast (2), ballast housing (3) and standard lamp base (4). The invented heat-shielded fluorescent lamp is characterized in that the lamp tube (1) is totally covered by a transparent or translucent envelope (5) whereas the cavity inside the envelope is vacuumed. The envelope is vacuum-tight and being fixed onto the housing of the ballast. The air pressure inside the envelope is below 100 mmHg.

It is well known that vacuum separation can prevent heat loss from conduction, and can also avoid the influence of surrounding temperature to the temperature inside the lamp. When lamp tube is working under the state of vacuum separation, the temperature of the cold spots is mainly decided by the heat produced by the lamp itself, while the influence of the surrounding is rather small. When the lamp is of reasonable lamp tube design and is working under a normal temperature (e.g. 25° C) and under the state of vacuum separation, the cold spot temperature should be at its optimum value.

When the newly invented lamp is working under different temperature, owing to the presence of vacuum separation, the temperature at the cold spots is close to the optimum temperature.

Hence, the light output of lamp is greatly improved. Though the surrounding temperature is very low (e.g. below 0° C), due to the presence of vacuum separation, the lamp tube can get started by the electric current supplied in preheat starting and heat loss due to conduction is avoided. As a result, temperature of the lamp tube rises and eventually the lamp tube starts to work in a short time. The temperature at the cold spots in the beginning is far lower than the optimum value, however, after the lamp tube has worked for some time, the heat produced will gradually affect the cold spots temperature to reach its optimum value. Finally, the lamp tube functions normally.

Additionally, to a man skilled in this field, the envelope (5) may have variety of shapes as illustrated in Fig. 2a - 2g such as projective shape, pear shape, mushroom shape, cylinder shape, oval shape, extruding oval shape and globe shape etc. Likewise, the lamp tube of the invented heat-shielded lamp can also have different shapes, e.g. U shape, double U shape, 3 U shape, H shape, double H shape, circular shape and spiral shape etc.

In order to better explain the advantages of the new invention, a comparison of test results between the newly invented lamp and a general fluorescent lamp of the same type is listed below. Both lamps achieve the highest light output at around 25° C. The light output and working conditions of both lamps under different temperatures are as follows.

SURROUNDING TEMPERATURE	35°C	25°C	15°C	0° C	-15° C
LIGHT OUTPUT Lm/W					
Newly invented lamp	58.2	59.8	56.6	51.4	45.2
General type of fluorescent lamp	53.5	60.5	47.0	25.3	not functioning

According to the above data, we conclude the advantages of the newly invented fluorescent lamp as the following:

1. When the surrounding temperature changes, the decrease in light output of the newly invented fluorescent lamp is smaller than that of general type of fluorescent lamp.

2. The newly invented fluorescent lamp can function properly under low temperature and is therefore suitable for use in cold area and outdoors.

Claims

1. A kind of heat shielded fluorescent lamp, consisting of lamp tube, ballast, ballast housing and standard lamp base, **characterized in that** the lamp tube is covered by a transparent or translucent envelope, the cavity inside the envelope is vacuumed, and the envelope is sealed and tightly fixed onto the lamp ballast whereas the air pressure inside the envelope is below 100 mmHg.
2. A fluorescent lamp according to Claim 1, **characterized in that** the envelope of lamp can be of pear shape, projective shape, mushroom shape, oval shape, extruding oval shape, cylinder shape or globe shape.
3. A fluorescent lamp according to Claim 1 - 2, **characterized in that** the lamp tube can be of U shape, double U shape, 3 U shape, H shape, double H shape, circular shape or spiral shape.
4. A fluorescent lamp according to Claim 1 - 3, **characterized in that** an adapting device is provided to affix the lamp tube onto the ballast housing.

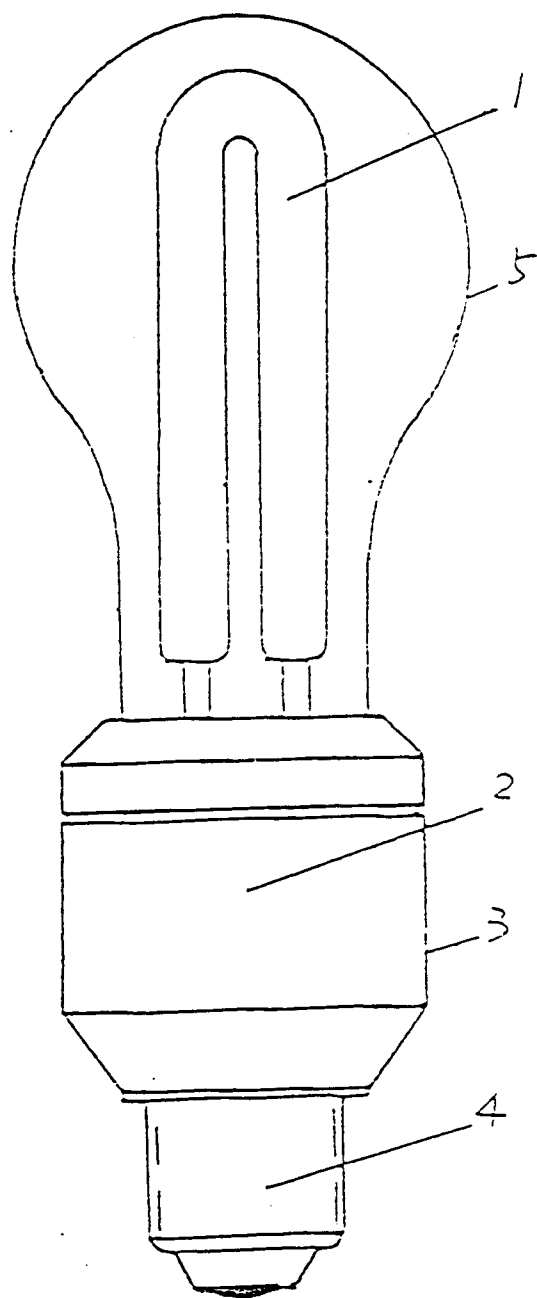


Fig. 1

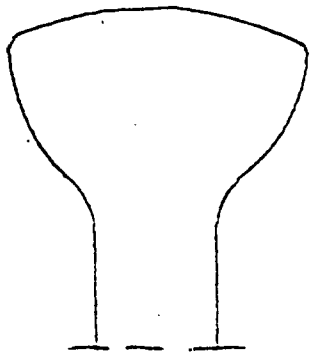


Fig. 2a

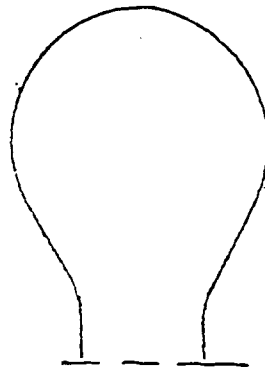


Fig. 2b

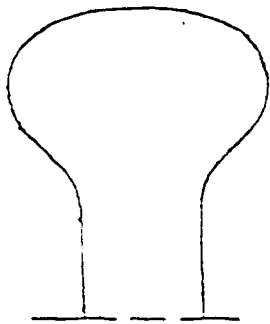


Fig. 2c

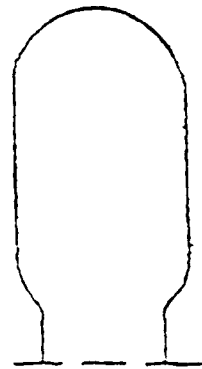


Fig. 2d

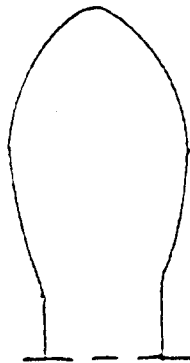


Fig. 2e

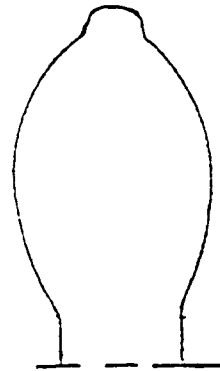


Fig. 2f

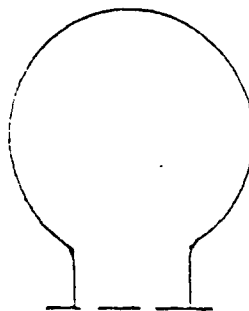


Fig. 2g



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EUROPEAN SEARCH REPORT

Application Number
EP 96 10 0948

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
Y	PATENT ABSTRACTS OF JAPAN vol. 013, no. 008 (E-702), 10 January 1989 & JP-A-63 218148 (MATSUSHITA ELECTRONICS CORP), 12 September 1988, * abstract *	1-4	H01J61/32 H01J61/34 H01J61/56 H01J61/12 H01J61/52
Y	--- PATENT ABSTRACTS OF JAPAN vol. 009, no. 318 (E-366), 13 December 1985 & JP-A-60 151951 (USHIO DENKI KK), 10 August 1985, * abstract *	1-4	
Y	--- EP-A-0 497 225 (TUNGSRAM RESZVENYTARSASAG) 5 August 1992 * column 1 - column 26 *	1-4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			H01J
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 29 May 1996	Examiner Martín Vicente, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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