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(54) **Low-pressure sodium discharge lamp**

Niederdruck Natrium Entladungslampe

Lampe à décharge à basse pression au sodium

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(56) References cited:
EP-A- 0 129 288

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Description

The invention relates to a low-pressure sodium discharge lamp comprising:

a discharge vessel which is sealed in a vacuumtight manner and has a filling comprising sodium and rare gas;
 electrodes arranged in the discharge vessel and each connected to at least one respective current conductor which issues to the exterior through a respective pinched seal, wherein the current conductors each have a first coating of borate glass which extends from within the relevant pinched seal to inside the discharge vessel, and in contact with said coating a second, lime glass coating which extends to outside the discharge vessel;
 and evacuated outer bulb which is provided with an IR reflection filter and which surrounds the discharge vessel.

Such a low-pressure sodium discharge lamp is known from US-A-4,783,612.

In the known lamp, the coatings have a butt joint which lies inside the relevant pinched seal. The first coating is resistant to sodium. This coating protects the current conductors against electric contact with liquid or solid sodium which could deposit against the pinched seal. The discharge arc could apply itself to the sodium if the coating were absent, which would lead to violent reactions and damage to the current conductor and the pinched seal.

The second coating is thicker than the first one and absorbs forces which result from the difference between the coefficients of thermal expansion of the discharge vessel and the current conductors.

The construction of the known lamp was found to be reliable in the case of operation at mains frequency. With high-frequency operation, however, cracks arise in the pinched seal after a few thousand hours already, leading to lamp leaks and thus to the end of lamp life.

It is an object of the invention to provide a low-pressure sodium discharge lamp of the kind described in the opening paragraph which is of a construction which is reliable also in the case of high-frequency operation.

According to the invention, this object is achieved in that the first coating extends through the entire pinched seal and is enveloped by the second coating in the pinched seal.

It is assumed that the damage to the known lamp operated at high frequency is caused by the higher electrical resistance which the current conductors have upon high-frequency operation, because they conduct the current substantially only along their surfaces in that case. The current conductors and the pinch then assume higher temperatures.

It was a surprise to find that the lamp according to the invention can be operated for thousands of hours at

high frequency without cracks appearing in the pinched seal.

An embodiment of the low-pressure sodium discharge lamp according to the invention is shown in the drawing, in which

Fig. 1 shows a lamp in side elevation, partly in longitudinal section; and

Fig. 1a shows a detail from Fig. 1 in cross-section on an enlarged scale.

In the drawing, the low-pressure sodium discharge lamp has a discharge vessel 1 which is sealed in a vacuumtight manner and contains a filling comprising sodium and rare gas.

Electrodes 2 are arranged in the discharge vessel, each connected to at least one respective current conductor 3 which issues to the exterior through a respective pinched seal 4. In the lamp shown, each electrode has two current conductors. The current conductors 3 each have a first coating 5 of borate glass which extends from the relevant pinched seal 4 to inside the discharge vessel 1, and in contact with the said coating 5 a second coating 6 of lime glass which extends to outside the discharge vessel.

An evacuated outer bulb 8 provided with an IR reflection filter 7 surrounds the discharge vessel and carries a lamp cap, for example, a bayonet cap 10.

The first coating 5 extends through the entire pinched seal 4 and is enveloped by the second coating 6 in the pinched seal.

Table 1

	(1),(6)	(5)	(1')
SiO ₂	63.3	5.6	5.7
B ₂ O ₃	0.8	17.2	18.5
Al ₂ O ₃	4.7	8.8	9.2
Na ₂ O	17.1		
K ₂ O	0.7	0.16	
MgO	3.1	5.1	5.0
CaO	4.7	10.3	10.0
BaO	5.2	50.4	50.4
SrO		0.9	1.1
ZrO ₂		1.5	
SO ₃	0.07		
remainder	0.33	0.04	0.1

(1') borate glass on discharge vessel

In the lamp shown, each electrode 2 has two current conductors 3, for example made of CrNiFe, each with an individual first 5 and individual second coating 6. The discharge vessel 1 is made of lime glass and has a layer

of borate glass at its inner surface in order to make the discharge vessel resistant to sodium. The outer bulb has an IR reflection filter, for example of tin-doped indium oxide, at its inner surface.

The lamp in the drawing has a first coating of borate glass which extends throughout the relevant pinched seal from inside the discharge vessel. It is favourable for the coating to extend to outside the discharge vessel so as to have manufacturing tolerances available. The second coating of lime glass may be made, for example, of the same glass as the discharge vessel. The presence of this coating is nevertheless visible, *inter alia* because it projects from the pinched seal.

The lamp of the type shown continued to burn after 9000 hours at a 125 kHz high-frequency supply without cracks becoming observable. Among a group of 106 lamps of the known type, however, lamps with cracks were found after 2000 hours already upon operation under identical circumstances. One fourth of the number of lamps exhibited cracks after 5000 hours. The compositions of the glasses used are given in % by weight in Table 1.

Claims

1. A low-pressure sodium discharge lamp comprising:

a discharge vessel (1) which is sealed in a vacuumtight manner and has a filling comprising sodium and rare gas;

electrodes (2) arranged in the discharge vessel (1) and each connected to at least one respective current conductor (3) which issues to the exterior through a respective pinched seal (4), wherein the current conductors (3) each have a first coating (5) of borate glass which extends from the relevant pinched seal (4) to inside the discharge vessel (1), and in contact with said coating (5) a second, lime glass coating (6) which extends to outside the discharge vessel (1);

an evacuated outer bulb (8) which is provided with an IR reflection filter (7) and which surrounds the discharge vessel (1),

characterized in that the first coating (5) extends through the entire pinched seal (4) and is enveloped by the second coating (6) in the pinched seal.

Patentansprüche

1. Niederdruck-Natriumentladungslampe mit:

einem gasdicht verschlossenen Entladungsgefäß (1) mit einer Natrium und Edelgas enthal-

tenden Füllung ;

in dem Entladungsgefäß angeordneten Elektroden (2), die jeweils mit zumindest einem jeweiligen Stromleiter (3) verbunden sind, der durch eine jeweilige Quetschdichtung (4) nach außen tritt, wobei die Stromleiter (3) jeweils einen ersten Überzug (5) aus Boratglas haben, der sich von der betreffenden Quetschdichtung (4) in das Entladungsgefäß (1) hinein erstreckt, und im Kontakt mit diesem Überzug (5) einen zweiten Überzug (6) aus Kalkglas, der sich bis außerhalb des Entladungsgefäßes erstreckt; einem evakuierten, mit einem IR-Reflexionsfilter (7) versehenen Außenkolben (8), der das Entladungsgefäß umgibt,

dadurch gekennzeichnet, daß der erste Überzug (5) durch die gesamte Quetschdichtung (4) hindurch verläuft und in der Quetschdichtung von dem zweiten Überzug (6) umgeben wird.

Revendications

1. Lampe à décharge dans la vapeur de sodium à basse pression comportant:

un récipient à décharge (1) qui est scellé d'une manière étanche au vide et qui présente un remplissage comportant du sodium et du gaz rare;

des électrodes (2) disposées dans le récipient à décharge (1) et chacune reliée à au moins un propre conducteur de courant (3) qui s'étend vers l'extérieur en traversant un propre scellement fermé par pincement (4), dans lequel les conducteurs de courant (3) présentent chacun un premier revêtement (5) en verre au borate qui s'étend à partir de l'intérieur du scellement fermé par pincement en question (4) vers l'intérieur du récipient à décharge (1), et en contact avec ledit revêtement (5) un deuxième revêtement en verre à chaux (6) qui s'étend vers l'extérieur du récipient à décharge (1);

une ampoule extérieure évacuée (8) qui est munie d'un filtre de réflexion infrarouge (7) et qui entoure le récipient à décharge (1),

caractérisée en ce que le premier revêtement (5) s'étend à travers tout le scellement fermé par pincement (4) et en ce qu'il est enveloppé par le deuxième revêtement (6) dans le scellement fermé par pincement.

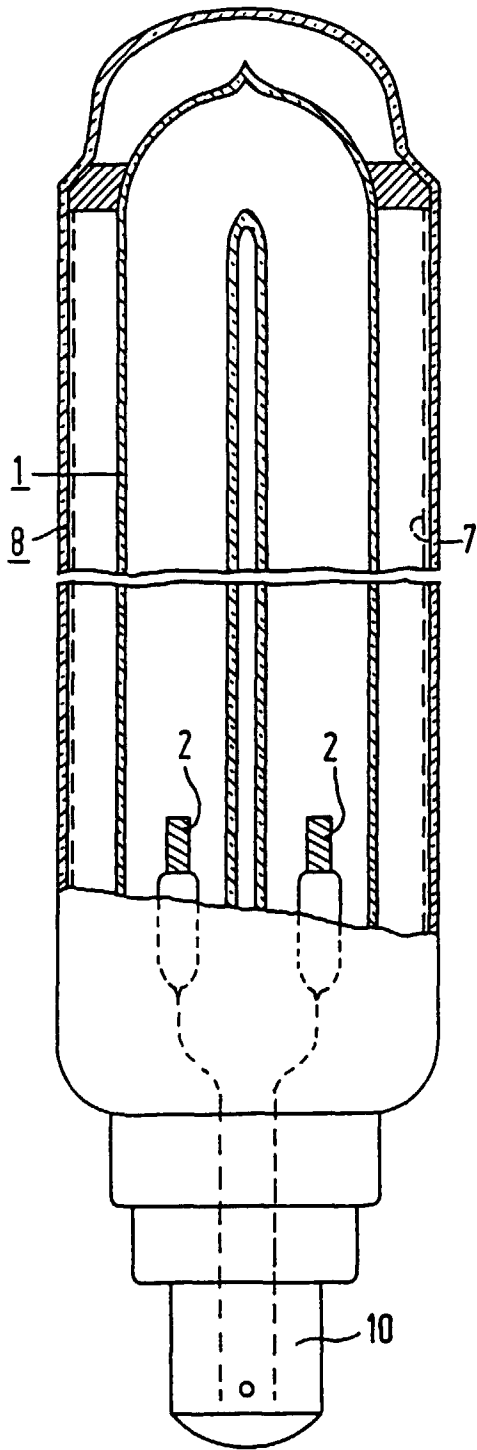


FIG. 1

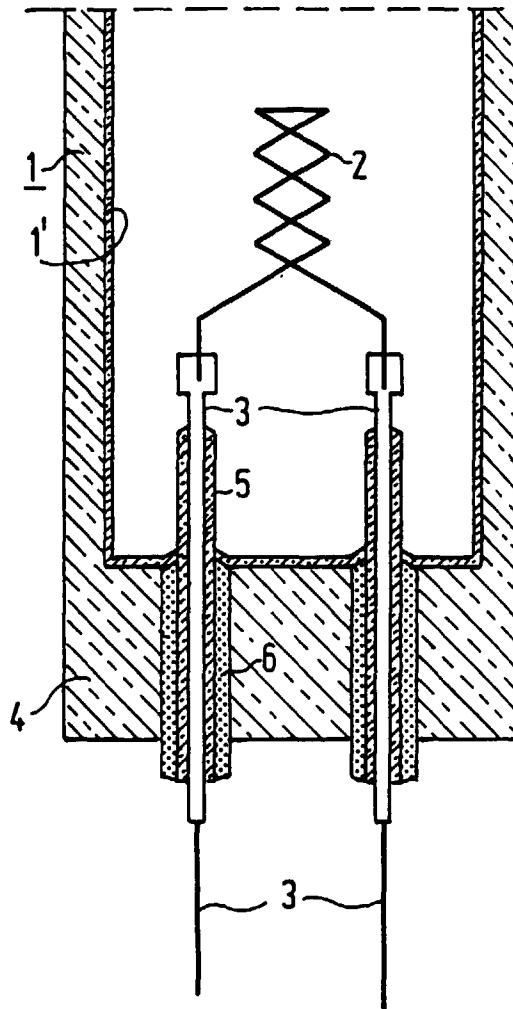


FIG. 1a