The invention relates to a high-pressure discharge lamp whose discharge tube mainly consists of ceramic material.

According to the invention a compartment is present at at least one end of the discharge tube while a wall of this compartment screening at least part of an adjacent electrode consists of ceramic material. The said wall is preferably part of a sealing member of the discharge tube.
HIGH PRESSURE DISCHARGE LAMP

The invention relates to a high pressure discharge lamp provided with a discharge tube whose filling comprises at least a metal in which the wall of the discharge tube mainly consists of ceramic material and in which an electrode is present in the discharge tube near both ends, a compartment being present between at least one of the electrodes and the adjacent end of the discharge tube, which compartment is in fluid communication with the part of the discharge tube in which the discharge is effected, a wall of said compartment screening at least part of an adjacent electrode from the interior of said compartment.

In this connection ceramics (or ceramic material) is understood to mean polycrystalline material such as, for example, densely sintered aluminum oxide or beryllium oxide and monocrystalline material such as, for example, sapphire.

A known high-pressure discharge lamp of the kind mentioned in the preamble is described, for example, in U.S. Pat. 3,422,300. A drawback of this known lamp is that the wall of the compartment screening part of an adjacent electrode consists of a metallic disc which is mounted on an electric lead-through conductor of this electrode. This is a drawback because the assembly of electrode and lead-through is rather wide. This leads to less freedom during manufacture in the advance provision of sealing members or screening members near the end of the discharge tube.

An object of the invention is to provide a high pressure discharge lamp in which there is great freedom in the provision of sealing members or screening members near an end of the discharge tube before the electrode system is provided.

According to the invention a high pressure discharge lamp provided with a discharge tube whose filling comprises at least a metal and in which the wall of the discharge tube mainly consists of ceramic material and in which an electrode is present in the discharge tube near both ends, and in which a compartment is present between at least one of the electrodes and the adjacent end of the discharge tube, which compartment is in free communication with the part of the discharge tube in which the discharge is effected, and in which a wall of said compartment screens at least part of the adjacent electrode from the interior of said compartment is characterized in that the wall of the compartment which screens at least part of the electrode is likewise made of ceramic material and that said wall forms a part of an entirely ceramic member which is secured to the wall of the discharge tube in a gastight manner.

An advantage of this lamp is that ceramic sealing members or screening members may be provided in advance near the end of the discharge tube and this before placing the electrode system in the discharge tube.

An advantage of the compartment is that it can be used as a reservoir for the metal, for example, mercury or an amalgam in the discharge tube. This prevents an irregular glowing of the arc near the electrode. Such an irregular glowing in a lamp without a compartment may be caused by temperature fluctuations of the electrode caused by quickly evaporating drops of metal or drops of, for example, a metal compound in the vicinity of this electrode.

The ceramic member may be, for example, a member which does not have a sealing function of the discharge tube. It is, for example, an annular member whose outer side is connected to the discharge tube in a gastight manner.

In a special embodiment of a high pressure discharge lamp according to the invention the ceramic member is a sealing member of the discharge tube.

An advantage of this preferred embodiment is that the ceramic member has a dual function namely it ensures in the first place the screening of the interior of the compartment against radiation from the adjacent electrode and in the second place it serves — or also serves — for sealing the discharge tube.

The screening wall of the compartment may consist of, for example, a ceramic part having a flat shape.

In a further preferred embodiment of a high pressure discharge lamp according to the invention the wall of the compartment screening at least part of the electrode consists of a collar-shaped bulge of the sealing member.

An advantage of this preferred embodiment is that a compartment can be obtained which is rotation symmetrical with respect to, for example, the lead-through for the electrode. This has the advantage that there is greater freedom in the choice of the operating positions of the discharge lamp.

The latter preferred embodiment may further be improved by providing the bulge near the adjacent electrode with a flanged thickened part.

An advantage thereof is that the compartment is better sealed from the space in the discharge tube in which the discharge is effected. The advantage is namely that there is less risk of a detrimental influence of metal drops near the electrode on the discharge.

In a further preferred embodiment of a high pressure discharge lamp according to the invention the compartment is substantially entirely bounded by an inner wall of a recess in the entire ceramic member.

An advantage of this preferred embodiment is that such a compartment can be obtained in a very simple manner. It may consist of, for example, drilling a hole in the ceramic member. In that case care is to be taken that the axis of this recess runs at most parallel to the axis of the discharge tube, or otherwise constitutes an acute angle with the adjacent alignment of this discharge tube. Otherwise a satisfactory screening of the radiation from the adjacent electrode cannot be obtained.

In a further preferred embodiment of a high pressure discharge lamp according to the invention, the free connection — between the compartment and the part of the discharge tube in which the discharge is effected has the shape of a ring which is bounded at one end by an electric supply conductor to the adjacent electrode and at the other end by the wall of the compartment which screens at least part of the electrode.

An advantage of this preferred embodiment is that the temperature of the compartment in which generally the lowest temperature of the discharge tube occurs can easily be controlled and this because this compartment is farther remote from the adjacent electrode.

In an improvement of the latter preferred embodiment of a high pressure discharge lamp according to the invention in which also a second ceramic member is present which is connected at least in a gastight manner to the first ceramic member the compartment consists of a recess in at least one of the two ceramic members, which recess is located on the side of the annular.
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3 free connection remote from the adjacent electrode. An advantage of this embodiment is that a compartment having very defined dimensions can be manufactured. This is important in connection with the compensation of the spread amongst discharge tubes of one and the same type.

In the latter improvement the recess may be entirely located in the first ceramic member or entirely in the second ceramic member or partly in the first ceramic member and partly in the second ceramic member.

The invention will further be described with reference to a drawing.

FIG. 1 is a perspective view of a discharge lamp according to the invention;

FIG. 2 is a longitudinal section through an end of the discharge tube of the lamp of FIG. 1;

FIG. 3 is a first modification of the sealing of the discharge tube;

FIG. 4 is a second modification of the sealing of the discharge tube;

FIG. 5 is a third modification of the sealing of the discharge tube;

FIG. 6 is a fourth modification of the sealing of the discharge tube;

FIG. 7 is a fifth modification of the sealing of the discharge tube;

FIG. 8 is a sixth modification of the sealing of the discharge tube;

FIG. 9 is a seventh modification of the sealing of the discharge tube;

FIG. 10 is an eighth modification of the sealing of the discharge tube.

In FIG. 1, 1 denotes a discharge lamp of a high pressure sodium vapour discharge lamp of 400 Watts. 2 denotes the outer envelope of this discharge lamp. 3 denotes the lamp cap. 4 denotes a terminal wire.

In FIG. 2, 10 denotes part of the discharge tube 1 of FIG. 1. This discharge tube is made of densely sintered aluminium oxide. This tube may alternatively be made of, for example, sapphire. The filling of the tube consists of an amalgam, namely a combination of sodium and mercury and also contains an ignition gas, for example, xenon. 11 denotes an electrode which is secured through a connection piece 12 to a tubular electric supply conductor 13 of, for example, niobium. A first entirely ceramic sealing member is denoted by 14. A second cover-shaped ceramic sealing member is denoted by the reference numeral 15. The first sealing member 14 is provided with a collar-shaped bulge which is denoted by 14a. In this manner an annular compartment 16 is formed between this bulge 14a and the adjacent part of the discharge tube 10, and the greater part of this compartment is screened by the wall 14a from the adjacent electrode 11. The parts 14, 15 and 10 are connected, for example, in a manner as described in Netherlands Pat. Application No. 6,704,681. A slightly flatter line denotes a sealing glass in the FIG. 2, etc..

FIG. 3 uses the same reference numerals as FIG. 2. The difference is, however, that a bulge 14c is used which relative to the bulge 14a of FIG. 2 is shifted to the electrode 11. An advantage of this embodiment is that the compartment 16 between the bulge 14c and the adjacent part of the discharge tube 10 has become larger so that more amalgam can be accommodated therein.

FIG. 4 shows a modification which only deviates in one detail from that of FIG. 3. In this case a flanged part 14d has been added to the bulge 14c, which part is at right angles to the longitudinal axis of the discharge tube. Consequently, the compartment 16 can still better be sealed from the rest of the discharge space which is located on the electrode side of the ceramic bulge.

FIG. 5 shows a further modification in which the sealing member of the discharge tube 10 again consists of two parts namely a first sealing member 30 and a second sealing member 31. The member 30 has the shape of a stud and 31 is shaped as a cover. In the modification of FIG. 5 the electrode is denoted by 33 and the tubular supply conductor of this electrode is denoted by 34. The member 30 is provided with a recess 36 and this on the side of an annular opening 35, between part 30 and the supply conductor 34, which side is remote from the electrode 33.

In the modification of FIG. 6 whose reference numerals are the same as those of the previous FIG. 5 the cover-shaped sealing member 31 also has a recess which adjoins the recess in the sealing member 30. The compartment 36 is therefore larger in the case of FIG. 6 than that of FIG. 5. In the modification of FIG. 6 relatively more amalgam can therefore be accommodated in the compartment.

In FIG. 7 the compartment 36 is entirely present in the ceramic member 31. The ceramic member 30 has no recess. Only the annular opening 35 between the member 30 and the lead-through conductor 34 can be seen. In FIG. 8 a first sealing member 44 is secured to the end of the discharge tube 10. 45 denotes the second sealing member. 46 denotes the electrode and 47 is the electrical lead-through. The compartment 48 in this modification again partly consists of a recess in the ceramic member 44 and partly of a recess in the second ceramic member 45.

FIG. 9 shows that a modification is possible in which the sealing members 54 and 55 are not directly connected together but are connected together through part of the wall of the discharge tube 10. 57 is a ceramic member connected to part 54. 58 denotes the compartment.

Finally FIG. 10 shows a modification with two sealing members 64 and 65 which are connected together — and to the discharge tube 10 — in the same manner as shown with reference to FIG. 2. The member 64 has a recess 68 representing a compartment. It is of course feasible that more similar compartments are present in the member 64 such as is represented, for example, by the part 69 shown in broken lines. Likewise it is possible for the compartment in the member 64 to consist of a circular groove.

What is claimed is:

1. A high-pressure discharge lamp having a first electrode and a second electrode and an elongated cylindrical discharge tube having a filling which comprises a metal, said discharge tube having a wall which consists primarily of ceramic material, the first electrode being disposed at a first end of the discharge tube and the second electrode being disposed at a second end of the discharge tube, a wall defining a compartment between at least one of the electrodes and the adjacent end of the discharge tube, the compartment being in fluid communication with the part of the discharge tube in which the discharge is effected, said wall screening at least part of an adjacent electrode from the interior of said compartment, wherein the portion of wall of the com-
partment screening at least part of the electrode is made of ceramic material, said wall constituting a part of an entirely ceramic member which is secured to the wall of the discharge tube in a gastight manner.

2. A high-pressure discharge lamp as claimed in claim 1, wherein said ceramic member is a sealing member for the end of said discharge tube which is secured in a gastight manner about an entire axial portion thereof.

3. A high-pressure discharge lamp as claimed in claim 2, wherein the wall of the compartment screening at least a part of the electrode comprises an axially extending annular bulge of said sealing member.

4. A high-pressure discharge lamp as claimed in claim 3, wherein said annular bulge has a radially extending flange disposed at one axial portion thereof.

5. A high-pressure discharge lamp as claimed in claim 2, wherein said compartment is substantially entirely bounded by an inner wall of a recess in the entirely ceramic member.

6. A high-pressure discharge lamp as claimed in claim 2, in which the fluid connection between the compartment and the part of the discharge tube in which the discharge is effected has an annular shape which is bounded at one axial extremity by an electric supply conductor which is connected to the adjacent electrode and at the other axial extremity by the portion of said wall of the compartment which screens at least part of the electrode.

7. A high-pressure discharge lamp as claimed in claim 6 further including a second ceramic member which is connected at least in a gas-tight manner to the first ceramic member, and wherein said compartment consists of a recess in at least one of the two ceramic members, said recess being disposed on the axial side of the annular fluid connection most remote from the adjacent electrode.