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- (73) Patenthaver: **Heraeus Noblelight GmbH, Heraeusstrasse 12-14, 63450 Hanau, Tyskland**
- (72) Opfinder: **VORONOV, Alex, Buchenweg 16, 63452 Hanau, Tyskland**
SPITZENBERG, Klaus, Hammerstr. 7, 63533 Mainhausen, Tyskland
Schilling, Franz-Josef, Kieselweg 2, 63579 Freigericht, Tyskland
- (74) Fuldmægtig i Danmark: **Denkemeyer & Associates S.A., Bavariastr. 7, D-80336 München, Tyskland**
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MENS DENNE ER DÆMPET**
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DIMMABLE AMALGAM LAMP AND METHOD FOR OPERATING THE AMALGAM LAMP WHILE DIMMED

The invention relates to a dimmable amalgam lamp, comprising a quartz glass tube, that envelopes a discharge space containing a filling gas and is closed on its two ends by means of pinchings, through which at least one electrical current bushing is guided to one coil-shaped electrode each into the discharge space, wherein at least one of the pinchings comprises a hollow space having an opening towards the discharge space and is designed to accommodate an amalgamate stock and can be heated by means of the coil-shaped electrode, and comprising a dimming facility by means of which a nominal lamp current I_{nominal} can be reduced to a lower actual lamp current I_{ist} .

In addition, the invention relates to a method for operating an amalgam lamp upon dimming.

15 Prior art

Such amalgam lamps are mercury low-pressure lamps, in which amalgam is used in order to increase the performance capacity. Amalgam lamps are used for technologically demanding applications, in which high UV-radiation densities and high operational reliability are achieved, such as for UV/sterilization and for oxidation.

20 In the process, a stock made of solid amalgam is brought into the discharge space in addition to the filling gas. The effect of the amalgam consists in controlling the mercury vapor pressure within the discharge space enclosed by the lamp body.

Such an amalgam lamp is known from US 2006/267495 A1. This consists of a quartz glass tube, which is closed on both sides by pinchings, through which an electrical current bushing is moved to one coil-shaped electrode each into the discharge space. To insert an amalgam stock it is proposed, to enclose solid amalgam in an auxiliary container, which is open towards the discharge space. The auxiliary container is positioned behind one of the electrodes. Since the container is open towards the filling gas, the solid amalgam is in thermodynamic equilibrium with the filling gas of the lamp. The auxiliary container projects either through the cylinder lateral surface of the quartz glass tube or through one of the pinchings into the discharge space. An additional fixation of the amalgam stock in the auxiliary container is thereby provided by means of a melted down hook-shaped holder.

The melting of the auxiliary container for the accommodation of the amalgam stock requires an additional process step and is connected to the risk of a loss of the quartz glass tube.

5 A dimmable amalgam lamp according to the type mentioned at the outset, as it is known from WO 2007/091187 A1, avoids this disadvantage. It is proposed to provide one of the pinchings with a hollow space opened towards the discharge space, into which the amalgam stock is inserted. In an alternative embodiment it is provided, that the amalgam stock is inserted into a spherical container, which has an opening upwards and which is held by a metal strip, which is embedded in the pinching. The
10 metal strip projects at the same time into the spherical container and anchors the amalgam stock therein.

In the vicinity of the amalgam stock a heating coil is provided, which has its own electrical circuit and a temperature control. Through this the amalgam stock can be kept at a specific temperature and thus an as high an efficiency level of the amalgam
15 lamp as possible can be ensured.

A special problem arises upon dimming of the amalgam lamp. In the case of amalgam lamps, in which the amalgam stock is located on the inner wall of the discharge space, the amalgam in the case of the nominal lamp output has an optimal temperature and thus ensures an optimal mercury vapor pressure. However, upon
20 dimming the heat flow from the discharge area between the electrodes to the amalgam stock is reduced, so that this becomes colder and the mercury vapor pressure and the efficiency level of the amalgam lamp drop.

According to WO 2007/091187 A1, the heating current is a function of the dimming level of the lamp.

25 However, the dimming level of the lamp does not correspond to the lamp current I_{ist} . For the lamp current I_{ist} is also impaired by external influences, such as the outdoor temperature.

US 2004/195954 A1 describes a sterilizing lamp in the form of a low-pressure mercury vapor discharge lamp, in which a container with an amalgam deposit is
30 attached to the outer wall of the lamp bulb and is connected fluidically to the interior of the lamp bulb. In another embodiment, the amalgam deposit is held in a sleeve by means of a hook. This is fed through a frontal pressing operation of the lamp bulb and positioned in the area outside of the discharge arc behind an electrode. It is open towards the interior of the lamp bulb.

In the case of the amalgam lamp known from WO 2007/091187 A1, the cooling of the amalgam stock is countered, while the temperature in the area of the amalgam and the dimming level are determined and a corresponding adjustment of the temperature of the separate heating device occurs.

- 5 However, the separate heating device and the temperature measuring device and control device require a considerable additional design expenditure.

Technical definition of task

- 10 The problem which thus underlies the invention is to provide a constructively simple amalgam lamp, which also maintains a high level of efficiency of UV-C-emission during operation with lower output (dimming).

Furthermore, the problem which underlies the invention is to indicate a procedure for operating the amalgam lamp upon dimming, which ensures a high level of efficiency of the UV-C radiation.

- 15 In respect to the amalgam lamp, this problem is solved based upon an amalgam lamp with the features of the type mentioned at the outset in that the electrical current bushing to the coil-shaped electrode comprises a supply line and a return line for a heating current I_{add} , wherein an adjusting facility is provided, by means of which the heating current I_{add} can be adjusted as a function of the level of the actual lamp
20 current I_{ist} , and wherein the adjusting facility is designed to adjust the heating current " I_{add} " as a function of the level of the actual lamp current in accordance with the following dimensioning rule:

$$I_{nominal} - 0.1 I_{nominal} \leq I_{add} + I_{ist} \leq I_{nominal} + 0.1 I_{nominal} \quad (1)$$

25

The temperature control of the amalgam stock serves to generate a mercury vapor pressure in the discharge space, which is independent of the current output of the amalgam lamp and which ensures the optimal level of efficiency for the UV radiation. There is thereby a range of optimal temperature of the amalgam, which is
30 independent of the nominal output of the amalgam lamp.

The electrode located adjacent to the amalgam stock is used for the temperature control of the amalgam stock. This thus serves both to generate an electric arc as well as to maintain a preset temperature of the amalgam stock.

During operation the electric arc engages the surface of the electrode, so that the latter is heated by the electric arc. This heating is dependent on the output of the electric arc and is transmitted by heat radiation to the amalgam stock. The contribution of the electric arc to the heating of the amalgam stock is small in comparison.

In the case of the amalgam lamp according to the present invention, a temperature control of the amalgam stock enclosed in the pinching is thus provided via the heated electrode, without an expensive additional heating device or the like having to be provided therefor.

However, upon dimming of the amalgam lamp the clamp current is reduced from the nominal value I_{nominal} (100% output) to a lower value and accordingly the heat flow is reduced from the coil to the amalgam stock, which thus no longer reaches the preset temperature. Thus, the vapor pressure of mercury within the discharge space and thus also the UV-C emission, drop to a value below the optimum.

To compensate for this heat loss, according to the present invention an additional current is sent through the coil-shaped electrode. The additional current heats the coil-shaped electrode, which is located in proximity to the amalgam stock, above the temperature, which would otherwise be adjusted with a dimmed lamp output.

The level of the additional current depends on the difference between the nominal output and the required output upon dimming.

The adjusting facility serves to adjust the additional current such that an optimal temperature of the amalgam stock remains even in dimmed operation and thus a high level of efficiency of the UV-C emission can be achieved. If the sum of additional current and actual lamp current in the dimmed operation is greater than twice the nominal lamp current, amalgam is overheated. If the sum of additional current and actual lamp current in the dimmed operation is smaller than 0.5 of the nominal lamp current, the amalgam stock, on the contrary, is too cold. In both cases, the level of efficiency of the UV-C emission drops. It has been shown, that in these boundary conditions an expensive temperature control can be waived for the temperature of the electrode or the amalgam stock.

In the ideal case, the additional current is adjusted by means of the adjusting facility as a function of the dimmed down actual lamp current such that the sum of additional current and actual lamp current corresponds exactly to the nominal lamp current. The deviations from this ideal value are in the range of +/- 10% (with regard to the

nominal lamp current). Accordingly, one embodiment of the amalgam lamp is proposed, in which the adjusting facility is designed to adjust the additional current "I_{add}" in accordance with the following dimensioning rule:

$$5 \quad I_{\text{nominal}} - 0.1 I_{\text{nominal}} \leq I_{\text{add}} + I_{\text{ist}} \leq I_{\text{nominal}} + 0.1 I_{\text{nominal}} \quad (1)$$

An additional current in this range ensures a maximum high level of efficiency of the UV-C emission both in operation with nominal lamp output as well as in operation with dimmed amalgam lamp.

- 10 In a particularly preferable embodiment of the amalgam lamp according to the present invention it is provided, that the amalgam stock is situated at a distance "L" (in m) from the coil-shaped electrode, which is adjusted as a function of the nominal lamp current on the basis of the following equation:

$$15 \quad \sqrt{2kI_{\text{nominal}}} \geq L \geq \sqrt{1/2kI_{\text{nominal}}}, \quad (2)$$

wherein I_{nominal} (in A) is the nominal lamp current of the amalgam lamp and the constant k = 0.25 x 10⁻³ (in m²/A).

- 20 In the case of temperature control of the amalgam stock enclosed in the pinching, the distance between the amalgam stock and the coil-shaped electrode play a substantial role. For, the greater the nominal lamp current is, the higher the temperature of the electrode is during operation of the amalgam lamp, and the greater the distance must be between electrode and amalgam stock, in order to
- 25 adjust the temperature in the area of the amalgam stock to the desired level and to prevent an overheating of the amalgam. By overheating, a deviation of the optimal mercury vapor pressure can occur and thus a reduction of the level of efficiency of the emitted UV-C radiation.

- Therefore, according to the present invention it is provided, that the amalgam stock is
- 30 situated a distance from the coil-shaped electrode, which is adjusted as a function of the nominal lamp current on the basis of the following equation:

$$\sqrt{2kI_{\text{nominal}}} \geq L \geq \sqrt{1/2kI_{\text{nominal}}}, \quad (2)$$

wherein I_{nominal} (in A) is the nominal lamp current and the constant $k = 0.25 \times 10^{-3}$ (in m^2/A).

The stretch between the emitter longitudinal axis positions of the coil and the amalgam stock is thereby understood as the distance between the amalgam stock and the coil-shaped electrode, specifically the longitudinal axis position of the outside of the coil facing the electric arc and the longitudinal axis position of the outside of the amalgam stock facing the electrode, as this is schematically represented in figure 1. The distance is defined by the length of the electric current supply lines for the coil-shaped electrode and by the diameter of the coil. In the case of the same coil diameters only the length of the electric current supply lines to the electrode is therefore decisive, which are also referred to below as "pins."

In the case of a smaller distance it can occur that the amalgam stock is overheated; and at a distance above the range mentioned the danger exists that the amalgam stock remains too cold. In both cases, the level of efficiency of the UV emission drops.

In a particularly preferable embodiment of the amalgam lamp according to the present invention it is provided, that the distance "L" (in m) between amalgam stock and coil-shaped electrode is adjusted on the basis of the following equation:

$$L = \sqrt{kI_{\text{nominal}}} \pm 0.2 \sqrt{kI_{\text{nominal}}} \quad (4)$$

According to the invention, the pinching is provided with a hollow space, within which the amalgam stock is accommodated. The hollow space is formed in the simplest case with the production of the pinching using a special molding tool. The amalgam stock is reliably fixed in this hollow space, so that it also cannot escape therefrom in tilting positions of the amalgam lamp.

A measure is preferred for fixing the amalgam stock within the hollow space, in which the hollow space opening has an opening width, which the amalgam stock cannot pass through.

The amalgam stock exists as a massive solid body and has a form and size, which prevents an escape as solid material from the hollow space opening into the discharge space. The placing of the amalgam stock in the hollow space hereby requires the insertion of amalgam in a fluid condition and a subsequent solidifying into the amalgam solid body, which fully or partially fills the hollow space. A measure suitable for this is further elucidated in detail below by means of an embodiment.

Alternatively or supplementary thereto, it has also proven to be advantageous, if a holding element projects into the hollow space, which is anchored to the amalgam stock.

5 The holding element contributes to the fixing or additional anchoring of the amalgam stock within the hollow space and is preferably at least partially embedded in the relevant pinching.

At the same time, a first embodiment of the amalgam lamp stands the test, in that the holding element consists of quartz glass and is guided from outside through the pinching into the hollow space.

10 In this connection, the holding element has a long, stretched out cylindrical part, which extends through the pinching and which permits a handling and alignment of the holding element producing the pinching. Furthermore, the holding element has a part projecting into the hollow space, which can be provided with a hook and which serves to anchor the amalgam stock. The holding element consists of quartz glass,
15 so that differences are prevented between the thermal expansion coefficients of the holding element and the material of the pinching, which is also quartz glass.

In an alternative and similarly preferred embodiment of the amalgam lamp according to the present invention, it is provided, that the holding element consists of metal and is connected to an electric current supply line of the electrode.

20 The metallic holding element is hereby welded to a supply line for the supply of current to the electrode. Thus, a preset position of the holding element results in respect to the hollow space to be produced. Therefore, it must be ensured in the production of the pinching, that the free end of the holding element will be in the hollow space to be produced thereby. On the other hand, the insertion and alignment
25 of a holding element in an additional process step is unnecessary.

With regard to the method for operating the amalgam lamp according to the present invention upon dimming, the above-mentioned problem is solved in that the additional current I_{add} is adjusted as a function of the level of the actual lamp current I_{ist} in accordance with the following dimensioning rule:

30

$$I_{\text{nominal}} - 0.1 I_{\text{nominal}} \leq I_{\text{add}} + I_{\text{ist}} \leq I_{\text{nominal}} + 0.1 I_{\text{nominal}} \quad (1)$$

Through this mode of operation it can be ensured, that also upon dimming the amalgam lamp the amalgam stock is kept at a temperature, which ensures a high

level of efficiency of the UV-C radiation. For upon dimming, the nominal lamp current I_{nominal} (corresponds to 100% of the lamp output) is reduced to a lower value, so that the coil-shaped electrode has a lower temperature, and thus the amalgam stock also cools down, which is tempered by this electrode according to the invention.

5 According to the invention, an additional current is conducted through the coil-shaped electrode, which depends on the difference between the nominal output of the amalgam lamp and the required output upon dimming.

Through the adjustment of the additional current within the range mentioned in equation (1) an optimal temperature of the amalgam stock is maintained and thus a
10 high level of efficiency of the UV-C emission. In the case of an additional current below the mentioned lower limit the danger exists that the amalgam becomes too cold, so that the mercury vapor pressure and as a result thereof the UV-C emission drops; however, in the case of an additional current above the range upper limit mentioned the danger exists that the mercury vapor pressure becomes too high,
15 which also leads to a reduction of the UV-C emission. It has been shown, that in the dimming operation of the lamp an expensive temperature adjustment can also thus be waived for the amalgam stock.

The additional current I_{add} is thereby adjusted in the ideal case, such that the sum resulting from the additional current and actual lamp current corresponds precisely to
20 the nominal lamp current. Minor deviations from this ideal case are readily acceptable, for example, deviations in the range of +/- 10% of the nominal lamp current. Accordingly, a procedure for the operation of the amalgam lamp is proposed, in which the additional current is adjusted in accordance with the following dimensioning rule:

25

$$I_{\text{nominal}} - 0.1 I_{\text{nominal}} \leq I_{\text{add}} + I_{\text{ist}} \leq I_{\text{nominal}} + 0.1 I_{\text{nominal}} \quad (1)$$

In an operation of the amalgam lamp in this range an optimally high level of efficiency of the UV-C emission is made possible both in the operation in the case of nominal
30 lamp output as well as in the case of a dimmed amalgam lamp.

Embodiment

The invention is elucidated in detail below by means of embodiments and drawings. The following is shown in detail in schematic representation:

- Figure 1 shows a detail of an embodiment of the amalgam lamp according to the present invention in a frontal view,
- Figure 2 shows the detail according to figure 1 in a lateral view in a cut along the line A-A,
- 5 Figure 2 shows a lateral view of a further embodiment of an amalgam lamp according to the present invention in detail,
- Figure 4 shows a further embodiment of the amalgam lamp according to the present invention in detail in a frontal
- 10 view, and
- Figure 5 shows an embodiment of the amalgam lamp according to the present invention in a wiring diagram, which shows a part of the power supply.

Figure 1 shows schematically one of the two ends of an amalgam lamp 20, which is distinguished by a nominal output of 800 W (in the case of a nominal lamp current of 8 A), an emitter length of 150 cm and thus by an output density of a little less than 5 W/cm. It consists of a quartz glass tube 1, which is closed on its ends by means of pinchings 2, in which molybdenum foils 3 as well as the ends of metallic connections to a coil-shaped electrode 5 are embedded. For this purpose, the electrode 5 has

20 "pins" 15, which are connected to the molybdenum foil 3.

Between the electrode 5 and a second electrode opposite it (not depicted in figure 1) an electric arc 13 is generated in operation, the base 14 of which ends on the surface of the electrode 5. The top edge of the electrode, with which the base point 14 of the electric arc 13 engages, is marked by a dotted line 12.

25 The pinching 2 on the depicted end is provided with a hollow space 9, which serves as the accommodation for an amalgam stock 6. The hollow space 9 has an opening 7 to the discharge space 8. The opening width of the opening 7 is clearly narrower than the maximum clear span of the hollow space 9 and also narrower than the maximum diameter of the amalgam stock 6, so that the amalgam is captured in the

30 hollow space 9 and cannot arrive in the discharge space 8 in solid form. In the embodiment the maximum opening width of the opening 7 is 2 mm.

Thus, the amalgam stock 6 is fixed in proximity to the electrode 5. The electrode 5 is heated by the electric arc to a temperature, which depends on the current output of the amalgam lamp 20 (see also figure 5) and which has an impact on the amalgam

stock 6 depending on the distance L. The distance L between the amalgam stock 6 and the length position 12 of the base point 14 is determined on the basis of the following equation:

$$L = \sqrt{kI_{\text{nominal}}}$$

- 5 wherein $k = 0.25 \times 10^{-3}$ (in m^2/A). The distance L is about 4.5 cm. in the amalgam lamp 20 in the embodiment. According to the invention, this distance is adjusted as a function of the nominal lamp current, which is done in practice by adjustment of the length of the pin 15. The distance L is measured between the upper edge 12 of the electrode coil and the upper edge 16 of the amalgam stock, as indicated by the block
10 arrow "L."

The amalgam lamp 20 is equipped with a (not depicted in the figure) dimming and adjusting facility, which is elucidated further in detail below by means of figure 5.

- From the view of **figure 2** it is clear, that the opening 7 of the hollow space 9 is narrowed in this viewing direction, so that the amalgam stock cannot pass through
15 the opening 7.

In **figure 3**, an additional fixation of the amalgam stock 6 is provided schematically by means of a quartz glass fiber 10, which extends through the pinching 2 into the amalgam stock 6 and which after production of the pinching forms a uniform quartz glass mass with the latter.

- 20 **Figure 4** shows a further embodiment of the amalgam lamp according the present invention, in which the amalgam stock 6 is additionally fixed in the hollow space 9 by means of a metallic hook 11. The hook 11 is welded on one of the pins 15 for the electrode 5, and its free end extends into the amalgam 6.

- The production of the amalgam lamp is elucidated below in detail by means of an
25 embodiment.

Electrodes 5 are inserted into a quartz glass tube and the two ends are closed with pinchings 2. To produce a pinching 2, a molding tool is used, which has a recess, which generates the pinching 2 including the hollow space 9.

- At the same time, the electricity connection 4, 3; 15 for the electrode 5 is thereby
30 embedded vacuum-tight. Via an opening in the side wall of the quartz glass tube 1 subsequently to be closed again, solid amalgam is applied to the opening 7 of the hollow space 9 and subsequently softened. The amalgam thereby flows off into the hollow space 9 and solidifies to the massive amalgam stock 6. It is essential thereby, that the amalgam stock 6 has a size after the solidifying, which prevents the

amalgam mass being able to reach the discharge space 8 via the narrowed opening 7.

The dimmable amalgam lamp 20 according to the present invention and a procedure in the dimmed operation are elucidated in detail below by means of **figure 5**. Figure 5 shows the ends of the (depicted broken) discharge space 8 of the amalgam lamp 20 according to figure 1, with the coil-shaped electrodes 5a, 5b situated opposite each other in the discharge space 8, the electrical connections of which are guided through the pinchings 2. Both pinchings 2 are provided with a hollow space 9, however, only that hollow space 9 is filled with an amalgam stock 6, which is adjacent to the coil (electrode) 5a.

The power supply of the amalgam lamp 20 comprises a first electrical circuit "A," which serves for heating the electrode 5a, and a second electrical circuit "B," which serves for applying the lamp voltage of nominal 100 volts. The electrical circuits "A" and "B" are with part of an adjusting facility 21.

Upon dimming the amalgam lamp 20, the nominal current I_{nominal} ($= 8 \text{ A}$) is reduced in the electrical circuit "B." Thus, the temperature of the electrode 5 and thus also the temperature of the amalgam stock 6 is reduced, so that the mercury-concentration in the discharge space 8 decreases, and thus the level of efficiency of the UV-C radiation is reduced. In order to compensate for this effect, an additional heating current I_{add} is guided through the electrode 5a via the electrical circuit "A," which leads to an increase in the temperature of the electrode 5a. This temperature increase causes an additional heating of the amalgam stock 6 arranged in proximity to the electrode 5a. The temperature increase of the electrode 5 is noticeable above all therefore, because in the vicinity of the base point 14 an approximately 10 times higher thermal output density prevails than the electric arc 13 (figure 1) causes between the electrodes 5a, 5b.

With a reduction of the nominal current by 20% ($I_{\text{ist}} = 0.8 \times I_{\text{nominal}}$) the heating current I_{add} is increased such that the following applies: $I_{\text{ist}} + I_{\text{add}} = I_{\text{nominal}}$ ($= 100\%$). The adjusting facility 21 is adjusted such that with each reduction of the nominal current it causes a compensation to 100% of the nominal current through a corresponding increase of the heating current.

Through this additional current a maximum possible UV_C emission is ensured in the dimmed operation.

DÆMPBAR AMALGAMLAMPE OG FREMGANGSMÅDE TIL BETJENING AF AMALGAMLAMPEN, MENS DENNE ER DÆMPET

PATENTKRAV

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1. Dæmpbar amalgamlampe, der består af et kvartsglasrør (1), som omslutter et afladningsrum (8), der indeholder en fyldgas, og som er lukket i sine to ender ved hjælp af klemninger (2), gennem hvilke der er ført mindst én elektrisk strømgennemføring (4) til hver én spiralformet elektrode (5) ind i afladningsrummet (8),
10 hvor mindst én af klemningerne (2) omfatter et hult rum (9), der omfatter en åbning (7) i retning mod afladningsrummet (8), og som er designet til at rumme et amalgamlager (6), og som kan opvarmes ved hjælp af den spiralformede elektrode (5), og som omfatter en dæmpningsanordning, ved hjælp af hvilken en nominel lampestrøm I_{nominel} kan reduceres til en lavere faktisk lampestrøm I_{faktisk} , hvor den elektriske
15 strømgennemføring (4) til den spiralformede elektrode (5) omfatter en forsyningsledning og en returledning for en varmemstrøm I_{add} , og hvor en justeringsanordning (21) er indeholdt deri, ved hjælp af hvilken varmemstrømmen I_{add} kan justeres som en funktion af niveauet af den faktiske lampestrøm I_{faktisk} , og hvor justeringsanordningen er designet på en sådan måde, at den kan justere varmemstrømmen " I_{add} " som en
20 funktion af niveauet af den faktiske lampestrøm i overensstemmelse med følgende ligning:

$$I_{\text{nominel}} - 0,1 I_{\text{nominel}} \leq I_{\text{add}} + I_{\text{faktisk}} \leq I_{\text{nominel}} + 0,1 I_{\text{nominel}} \quad (1)$$

2. Amalgamlampe ifølge et af de foregående krav, **kendetegnet ved, at**
25 amalgamlageret er anbragt i en afstand L (i m) fra den spiralformede elektrode, hvor afstanden L er justeret som en funktion af den nominelle lampestrøm i overensstemmelse med følgende ligning:

$$\sqrt{2k} I_{\text{nominel}} > L > \sqrt{1/2k} I_{\text{nominel}}, \quad (2)$$

hvor I_{nominel} (i A) er amalgamlampens nominelle lampestrøm og konstanten $k = 0,25$
30 $\times 10^{-3}$ (i m^2/A).

3. Amalgamlampe ifølge krav 2, **kendetegnet ved, at** afstanden L (i m) mellem amalgamlageret og den spiralformede elektrode er justeret i overensstemmelse med følgende ligning:

$$L = \sqrt{k} I_{\text{nominel}} \pm 0,2 \sqrt{1/2k} I_{\text{nominel}}, (3).$$

5

4. Amalgamlampe ifølge et af de foregående krav, **kendetegnet ved, at** åbningsbredden af den hule rum-åbning (7) er således, at amalgamlageret (6) ikke kan passere igennem den.

10 5. Amalgamlampe ifølge et af de foregående krav, **kendetegnet ved, at** et holdeelement (10; 11), som er forankret til amalgamlageret (6) rager ind i hulrummet (9).

6. Amalgamlampe ifølge krav 5, **kendetegnet ved, at** en del af holdeelementet (10; 11) er indlejret i klemningen (2).

15

7. Amalgamlampe ifølge et af kravene 5 eller 6, **kendetegnet ved, at** holdeelementet (10) består af kvartsglas og er ført udefra gennem klemningen (2) ind i hulrummet (9).

20 8. Amalgamlampe ifølge et af kravene 5 eller 6, **kendetegnet ved, at** holdeelementet (11) består af metal og er forbundet med en elektrisk strømforsyningsledning (4) for den spiralformede elektrode (5).

9. Fremgangsmåde til betjening af en amalgamlampe ifølge et af kravene 1 til
25 8, efter dæmpning, **kendetegnet ved, at** den ekstra strøm I_{add} er justeret som en funktion af niveauet af den faktiske lampestrøm I_{faktisk} i overensstemmelse med følgende ligning:

$$I_{\text{nominel}} - 0,1 I_{\text{nominel}} \leq I_{\text{add}} + I_{\text{faktisk}} \leq I_{\text{nominel}} + 0,1 I_{\text{nominel}} (1).$$

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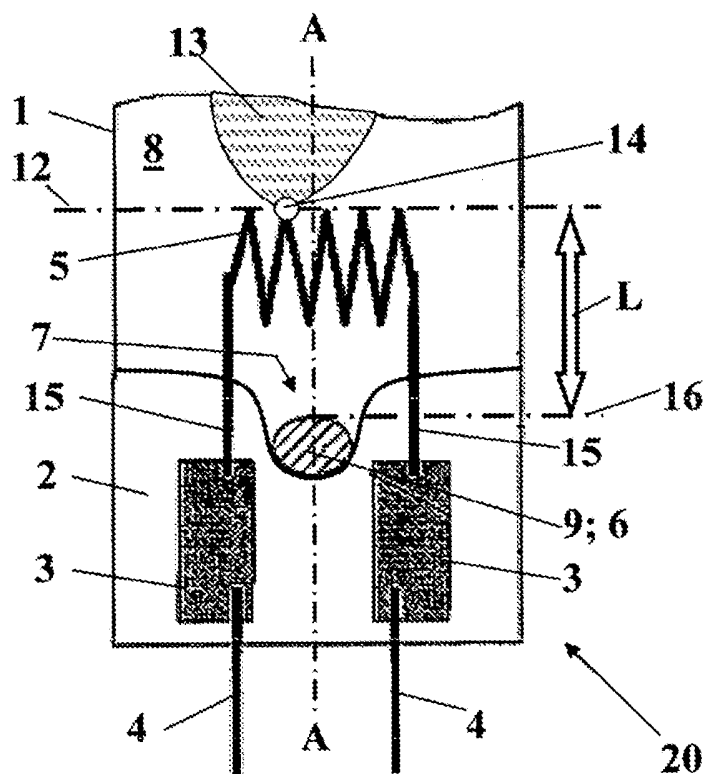


Fig. 1

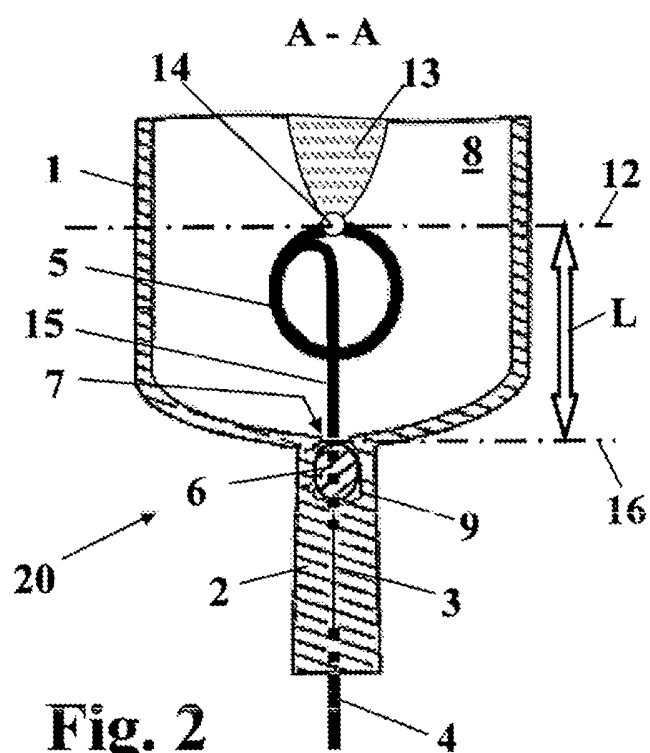


Fig. 2

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A - A

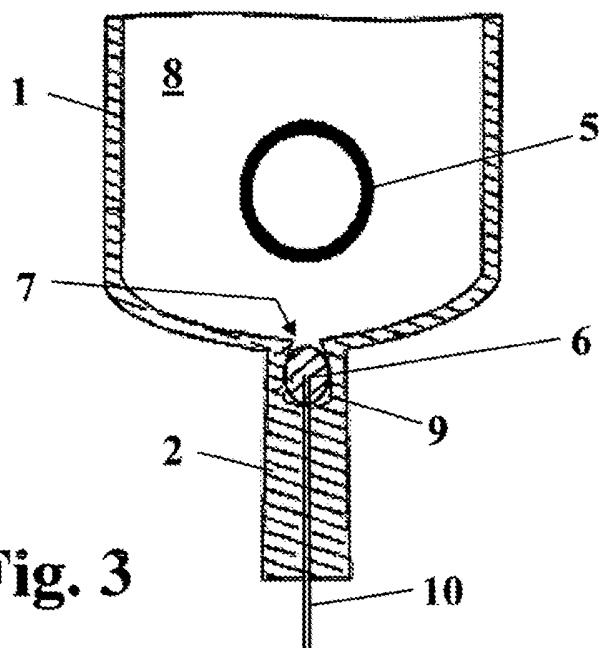


Fig. 3

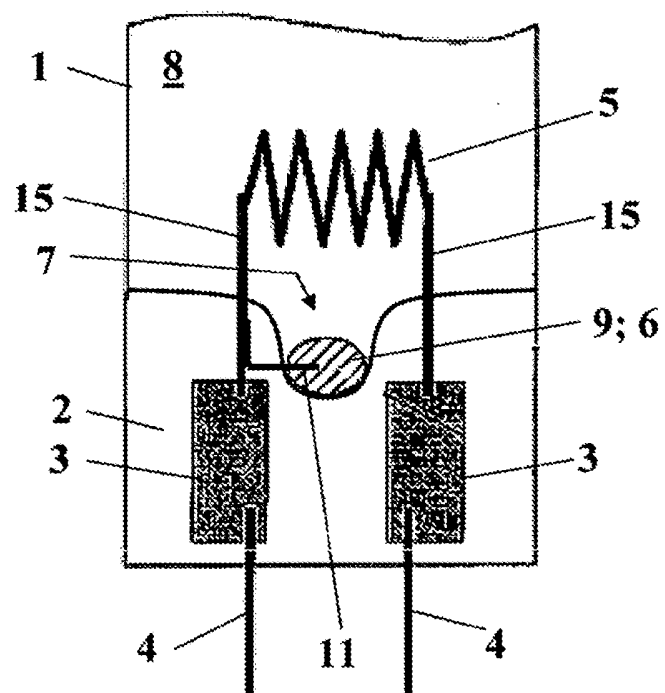


Fig. 4

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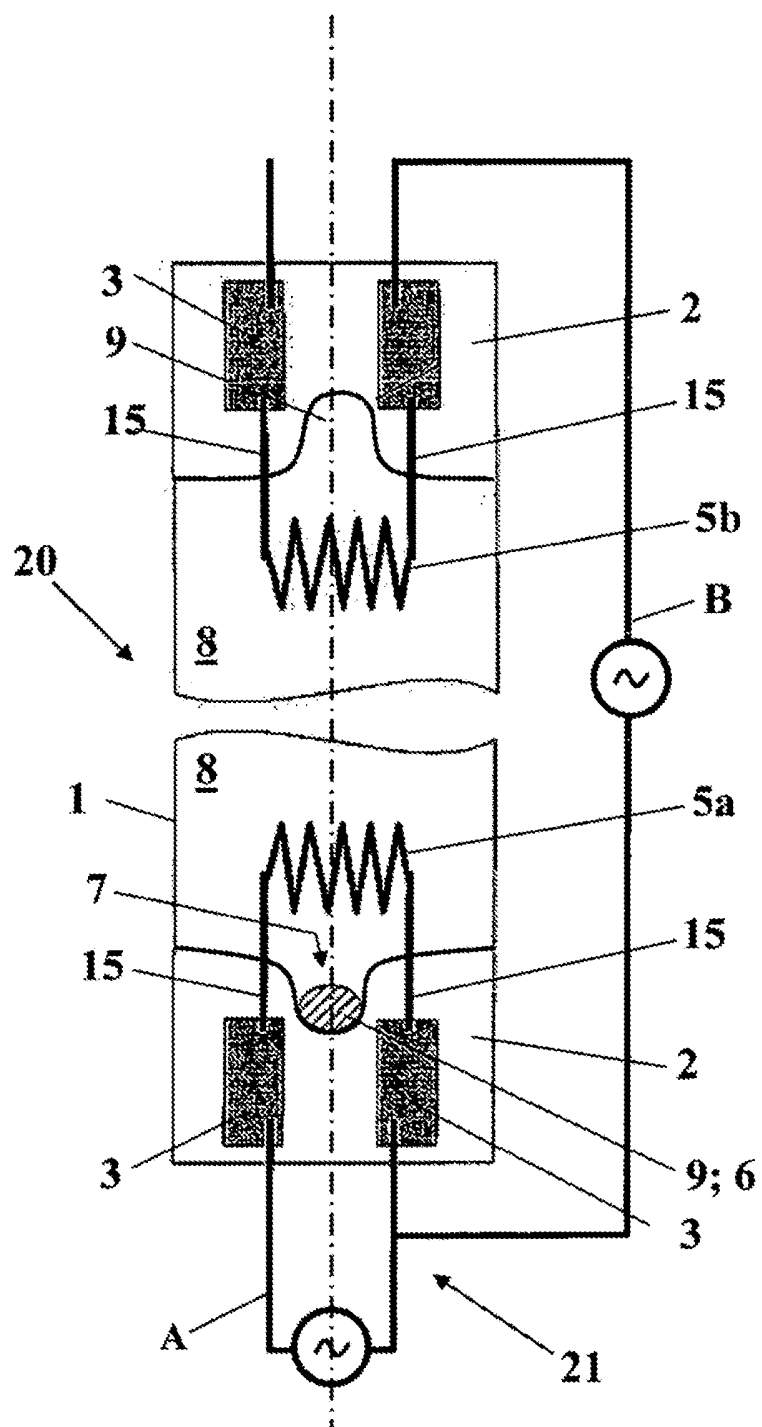


Fig. 5