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[54] **METHOD OF MANUFACTURING A HALOGEN INCANDESCENT LAMP**

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[58] **Field of Search** 316/20, 24; 313/223

[56] **References Cited**

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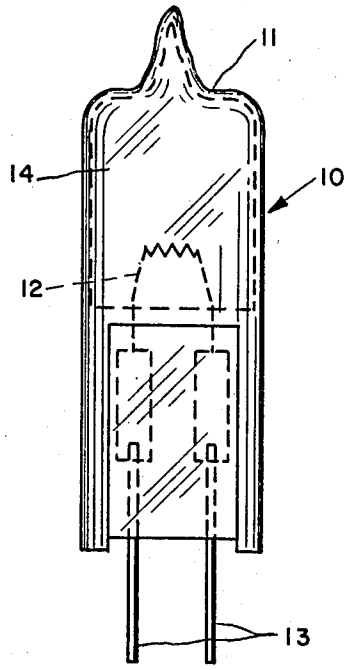
[57] **ABSTRACT**

A lamp having a gas filling comprising hydrocarbon halide is cooled to below the condensation temperature of the inert gas in the gas filling and is immediately thereupon operated so as to decompose the hydrocarbon halide.

3 Claims, 1 Drawing Figure



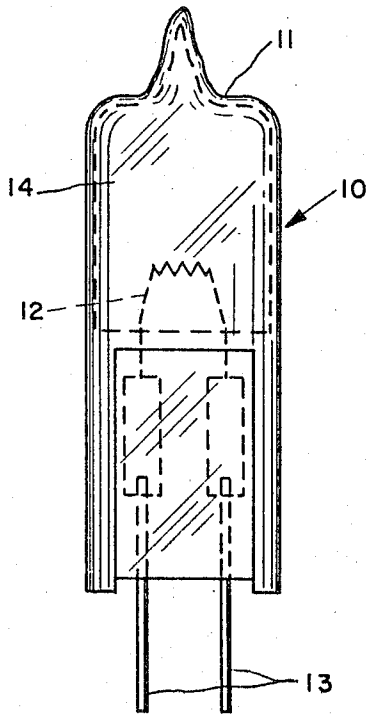


FIG. 1

METHOD OF MANUFACTURING A HALOGEN INCANDESCENT LAMP

The invention relates to a method of manufacturing a halogen incandescent lamp in which the lamp provided with a filament is filled with a gas mixture comprising an inert gas and a hydrocarbon halide compound or a mixture of these compounds, the lamp being sealed and subsequently operated so as to decompose the hydrocarbon compound into carbon and hydrogen halide.

If the hydrocarbon compounds present in the lamp are not decomposed carefully, there is a risk of formation of black coloured carbon deposits on the wall of the envelope. As a result the lamp will get an unpleasant appearance. The black deposits, however, also absorb heat and may therefore cause local overheating of the wall of the envelope so that the wall is weakened. Generally the gas pressure in halogen lamps during operation increases to values of more than 1 atmosphere. When the wall of the envelope is weakened it consequently swells and in serious cases the lamp explodes. When manufacturing halogen incandescent lamps the following method is used for decomposing the hydrocarbon halide compounds to prevent deposition of carbon on the wall of the envelope.

A voltage is applied across the terminals of the lamp which voltage is equal to part of the operating voltage and subsequently the voltage across the terminals of the lamp is slowly increased until the operating voltage or a voltage which is some tens of volts higher is achieved. During this process the temperature of the filament thus increases slowly from a relatively low value to the ultimate or a slightly higher value. In case of hydrocarbon halide pressures which are not too high (up to approximately 10 Torr) it is achieved by this method to decompose substantially all of the hydrocarbon halide compound which is present in the lamp on the filament. At pressures of more than 10 Torr this is, however, not quite possible with this method. A drawback of this method is that this operation may require from several minutes to 10 minutes dependent on the type of lamps and the gas filling.

It has been proposed to decompose the hydrocarbon halide compound outside the lamp during filling, for example, by heating the exhaust tube during filling. In this method an accurate control of the flow rate of the filler gas and of the temperature of the exhaust tube is required.

This proposal has the advantage that the formation of black coloured carbon deposits on the wall of the envelope is avoided when the method is performed correctly.

According to this proposal it is likewise avoided that tungsten carbides might be formed on the filament which might result in the filament becoming brittle.

The quantity of carbon released during decomposition is, however, small in most cases as compared with the quantity of carbon considered to be admissible in the filament body so that the formation of carbides generally does not occur to an extent which might be harmful for the lifetime.

When decomposing the hydrocarbon halides outside the lamp an important advantage connected with the use of hydrocarbon halide compounds in cycle lamps is lost. When decomposing within the lamp the released carbon may serve as a getter for unwanted residual gases such as oxygen in some lamps.

The present invention has for its object to provide a method in which the drawbacks of the described methods are obviated.

In FIG. **1** a lamp is shown in which the invention may be incorporated. The lamp has an envelope **11** and filament **12** and lead-in conductors **13.** The atmosphere is enclosed in space **14.**

According to the invention the method of manufacturing a halogen incandescent lamp in which the lamp provided with a filament is filled with a gas mixture comprising an inert gas and a hydrocarbon halide compound or a mixture of these compounds and in which the lamp is sealed and subsequently operated so as to decompose the hydrocarbon halide compound into carbon and hydrogen halide is characterized in that the lamp is cooled to a temperature below the condensation temperature of the inert gas present in the lamp and is thereupon immediately operated. When using the method according to the invention the lamps may be switched on to at least 50 percent of the operating voltage immediately after cooling whereafter the voltage can be increased within a very short period to, for example, 110 percent of the operating voltage without carbon deposits being formed on the wall of the envelope.

Practice has proved that it is insufficient to cool the lamp to a temperature between the condensation temperature of the hydrocarbon halide compound and the condensation temperature of the inert gas, the latter being the lowest temperature of both. In this case there is substantially no demixing and condensation. However, when cooling takes place below the condensation temperature of the inert gas these difficulties do not occur.

When using the method according to the invention the hydrocarbon halide compounds in halogen incandescent lamps can be decomposed within several seconds without black deposits being formed on the wall of the envelope.

The cause of the favourable effect of the step proposed according to the invention is not quite understood. During the decomposition treatment according to the invention a temperature distribution may occur in the lamp in such a manner that the temperature on the filament only is high enough to bring about decomposition of the hydrocarbon halide compound.

In the method according to the invention the halogen incandescent lamps may be cooled by immersing them in a liquified gas such as, for example, liquid nitrogen. When using liquid nitrogen as a coolant, gases such as argon, xenon and krypton may be condensed. The invention will now be described in greater detail with reference to an example.

EXAMPLE

A halogen incandescent lamp (24V, 250W) comprising a mixture of krypton (partial pressure **3** atm.) and CH_2Br_2 (partial pressure 2.5 Torr) is cooled to approximately 195°C by immersion in nitrogen. Immediately after the lamp has been removed from the liquid nitrogen a voltage is applied across the terminals which is 80 percent of the operating voltage. The voltage is increased within 20 seconds to 110 percent of the operating voltage. Decomposi-

tion of the alkylbromide compound then occurs in such a manner that no black deposits are formed on the wall.

When the lamp is pre-operated in the same manner, but without a previous cooling treatment, carbon is deposited in a black layer on the wall of the envelope.

When the lamp is operated in the conventional manner, 3 minutes are required therefor during which the voltage is increased from 0V to 27V.

The method according to the invention has the following advantages:

1. Pre-operation of the lamps during which the hydrocarbon halide compounds is decomposed is less time-consuming than that according to the known method.

2. The method may alternatively be used for lamps having a relatively large envelope volume in which it is impossible to keep the envelope bright in case of normal pre-operation.

3. It is now possible to use higher hydrogen halide pressures; due to the large quantity of hydrobromic acid obtained in this manner in the lamp, the lamp becomes less sensitive to breakdown.

What is claimed is:

1. A method for manufacturing a halogen incandescent lamp comprising:

providing a generally transluscent envelope having a filament disposed therein and external terminals connected to said filament;

forcing a gas mixture comprising an inert gas and at least one hydrocarbon halide compound into the envelope;

sealing the envelope;

cooling said lamp to a temperature below the condensation temperature of the inert gas present in the gas mixture; and

immediately operating the lamp comprising said sealed envelope, filament and terminals to decompose the hydrocarbon halide compound into carbon and hydrogen halide.

2. The method as described in claim **1** wherein said filling step comprises adding at least a second hydrocarbon halide compound to the gas mixture within the lamp.

3. The method as described in claim **1** wherein an operating step comprising applying across the terminals of the lamp a voltage which is equal to less than the operating voltage of the lamp for an interval of time and thereafter increasing the voltage across the terminals of the lamp slowly until the operating voltage or higher is achieved.

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