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ELECTRIC INCANDESCENT LAMP

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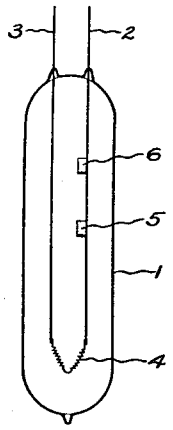

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ELECTRIC INCANDESCENT LAMP

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2 Claims. (Cl. 176—16)

Our invention relates in general to electric incandescent lamps comprising a tungsten or other refractory metal filament mounted within a sealed envelope containing a gaseous filling. More particularly, our invention relates to so-called "getters" for such lamps.

In order that lamps with an operating pressure exceeding 4 atmospheres shall be capable of withstanding the high wall temperatures which result, on the one hand, from the high temperature at which the filament is operated, and on the other hand from the fact that the bulb of such lamps is made considerably smaller than those of ordinary incandescent lamps, they are provided, as a rule, with a bulb made of quartz or of a hard type of glass. In practice, however, the manufacture of the bulb of quartz frequently gives rise to difficulties which cause, among other things, a relatively large quantity of impurities in the quartz. In addition, the degasification customary in the manufacture of the lamp as a rule does not have the result that all traces of gas, which might be contained in the material of the bulb, are actually driven out. In this de-gasification operation a diffusion through the wall of the bulb occurs as a result of the high temperatures at which it must be carried out in the case of quartz, so that under certain circumstances impurities may penetrate into the bulb.

It has previously been suggested to provide bodies of zirconium in discharge tubes for the purpose of absorbing impurities or traces of gas. These bodies of zirconium, however, did not have the desired effect as a rule, since not all residual gas was absorbed.

One object of our invention is to provide a getter which will effectively absorb the residual gases in an electric incandescent lamp to thereby reduce blackening of the lamp bulb and also to prevent failure of the lamp on account of the attack of the filament by water vapor.

Another object of our invention is the provision of a gas-filled electric incandescent lamp with a getter consisting of at least two separate bodies of getter material located at different points within the lamp bulb such that the different temperatures attained by the getter bodies, during operation of the lamp, approximates those temperatures at which the absorption of certain types of gas traces or impurities by the getter material is a maximum.

Still another object of our invention is the provision of a gas-filled electric incandescent lamp with a getter consisting of at least two bodies of metallic zirconium located at different points within the lamp bulb such that the temperature attained by at least one of said bodies during lamp operation corresponds to approximately 500° C. at which temperature the absorption of hydrogen by the zirconium is a maximum, and the temperature attained by at least one other of said bodies corresponds approximately to 700° C. at which temperature the absorption of oxygen by the zirconium is a maximum.

Further objects and advantages of our invention will appear from the following description of a species thereof and from the accompanying drawing which is an elevation of a baseless electric incandescent lamp according to our invention.

The invention provides the possibility of absorbing the impurities or traces of gas in a suitable and effective manner in an incandescent lamp of the previously mentioned type, the bulb of which contains a gaseous filling such as krypton, xenon, argon or nitrogen in certain cases in addition to the vapor of a material vaporized during the operation of the lamp.

The applicants have found that zirconium absorbs traces of gas or impurities in different ways at different temperatures. Specifically, the applicants have discovered that zirconium will absorb different materials most effectively at temperatures that differ from each other. The lamp according to the invention is based on this knowledge. It is characterized by the fact that in a space of the lamp in which a temperature drop exists, bodies of zirconium are arranged in such a way that the temperature which is attained by each of these bodies, during lamp operation, corresponds to that temperature at which the absorption of a certain trace of gas or of a certain impurity by the zirconium is a maximum. By means of this arrangement, the gas traces which are to be removed from the gas filling and which might have a detrimental influence on the action of the lamp are automatically and effectively absorbed by the zirconium. When the bulb is made of quartz, then it is possible to de-gasify the bulb during the manufacture of the lamp at a temperature of approximately 1000° C. Apparently zirconium becomes particularly effective at this temperature. The bodies of zirconium are, to advantage, pretreated in such a way as to absorb a small quantity of oxygen whereby the effectiveness of the zirconium apparently is also increased.

In accordance with the impurities to be expected in the gas filling, the bodies of zirconium are arranged in a space of the lamp which has a temperature drop. The applicants have found that zirconium at a temperature of approximate-

ly 500° C. particularly absorbs hydrogen, while at a temperature of approximately 700° C. it particularly absorbs oxygen. Since these two gases are the main impurities that occur in the gas filling, it is, in general, possible to arrange bodies of zirconium in the indicated space at the two points at which the circulating gases have approximately the indicated temperatures. In a simple physical embodiment of the lamp, according to the invention, the above-mentioned zirconium parts are arranged on one of the current supply wires.

Referring to the drawing, the electric incandescent lamp there shown comprises a bulb or envelope 1 of quartz, a pair of leading-in or current supply wires 2, 3, and a double-coiled filament 4, of tungsten or other refractory metal, mounted within the envelope 1 on said leading-in wires and connected thereto. The envelope is filled with a gas filling consisting of krypton and nitrogen to a pressure such that the operating pressure in the lamp is approximately 25 atmospheres. Two bodies of zirconium are arranged on the supply wire 2. In the space of the bulb there exists, figured from the bottom to the top, such a temperature drop that the body of zirconium 5 will attain a temperature of approximately 700° C. and the body 6 a temperature of approximately 500° C. when the lamp is in operation. As a result, the zirconium bodies 5 and 6 will respectively absorb the oxygen and hydrogen traces that are present in the lamp and which may be liberated from the quartz of the bulb. These traces otherwise would exert a very damaging influence on the properties of the lamp. It is obvious that, if desired, the arrangement of the bodies of zirconium may be suitably changed if it should be found that at another temperature than those mentioned above, a different impurity can be better absorbed from the gas filling. The temperature of the zirconium bodies can be regulated at will by the arrangement of the said zirconium parts on the current supply wires.

The illustration shows that the bodies of zirconium are arranged on one of the current supply wires. In certain cases it is possible to arrange these parts in the bulb on a special supporting rod or in some other way. Also, instead of only two bodies of zirconium within the lamp, three or more separate bodies may be employed, if desired, these bodies being so arranged within the lamp as to attain the desired temperature during lamp operation.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. An electric incandescent lamp comprising an envelope containing a gas filling, a refractory metal filament mounted within said envelope, and at least two bodies of metallic zirconium arranged within said envelope in a space in which a temperature drop exists, said bodies being located at such points that the temperature attained by at least one of said bodies corresponds to a minimum of approximately 700° C. and the temperature attained by at least one other of said bodies corresponds to a maximum of approximately 500° C.

2. An electric incandescent lamp comprising an envelope containing a gas filling, leading-in wires extending into said envelope, a refractory metal filament mounted within said envelope and connected to said leading-in wires, and two bodies of metallic zirconium mounted on one of said leading-in wires at different points such that the temperature attained by one of said bodies corresponds to a minimum of approximately 700° C. and the temperature attained by the other of said bodies corresponds approximately to a maximum of 500° C.

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