June 9, 1931. D. K. WRIGHT 1,809,661

ELECTRIC LAMP

Filed Feb. 18, 1929

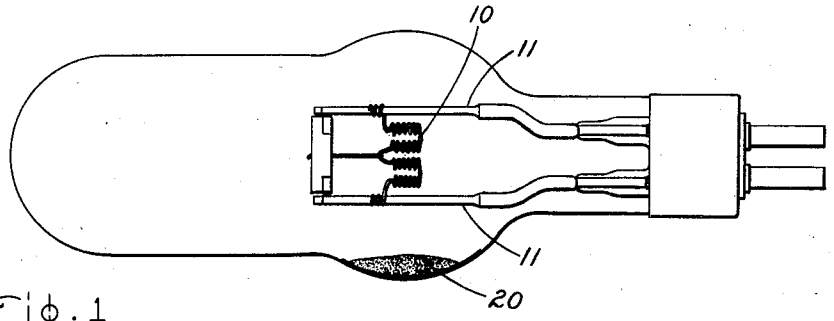

Fig. 1

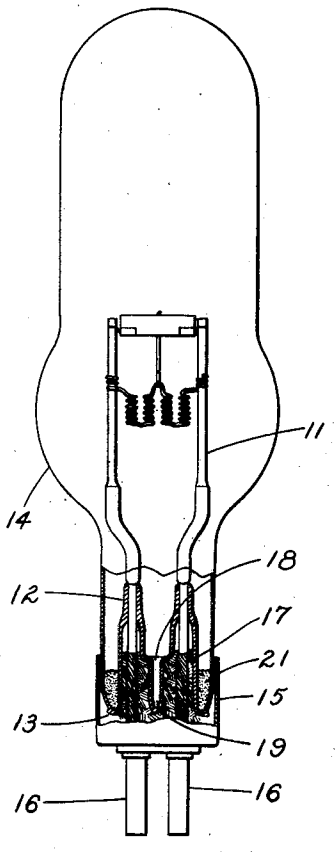

Fig. 2

INVENTOR:
DANIEL K. WRIGHT
BY Charles V. Tullar
HIS ATTORNEY

Patented June 9, 1931 1,809,661

UNITED STATES PATENT OFFICE

DANIEL K. WRIGHT, OF CLEVELAND HEIGHTS, OHIO, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

ELECTRIC LAMP

Application filed February 18, 1929. Serial No. 341,004.

My invention relates to electric lamps and similar electrical devices which comprise electric energy translation elements such as filaments and electrodes which are enclosed in a hermetically sealed glass or other transparent bulb or container. My invention consists of means for removing deposits which are formed on the inner surface of the bulb or other transparent container during the operation of the device. My invention finds particular application to electric incandescent lamps in which a filament is heated to incandescence although it is obvious that it is also applicable to certain types of arc lamps and to other electrical devices comprising elements which are heated to high temperatures and for this reason give rise to vapors which are condensed on the inner surface of the transparent container. In the case of electric incandescent lamps of the high wattage type, which are ordinarily of the gas-filled type disclosed in Langmuir Patent No. 1,180,159, issued April 18, 1916, the life of the lamp has been limited more on account of the formation of the dark colored deposit on the bulb than of failure of the filament. Some of these lamps, particularly those used for projection, are quite expensive and their comparatively short life has hampered their commercial use. The object of my invention is to provide means whereby the deposit on the bulb surface may be removed very conveniently and the life of the device greatly prolonged. Another consideration is that my invention permits the operation of the lamp at higher efficiency.

According to my invention a quantity of loose granular material is included in the bulb or other container, and this material is of such a nature that it will not injuriously affect the filament or electrodes which, in the operation of the device, are heated to very high temperatures. In the course of my experiments I have tried various materials such as finely divided alundum which is fused aluminum oxide, and carborundum which is an electric furnace product consisting of silicon carbide. While these materials have functioned fairly well in the removal of the deposit, they are open to the objection that if any of such materials become deposited, for instance, on the filament of an incandescent lamp which is ordinarily of refractory metal such as tungsten, they will fuse and are also vaporized to a certain extent causing short circuiting, arcing and corrosion of the filament. According to my invention, I use as the preferred scouring material finely divided tungsten although other highly refractory metals such as tantalum and molybdenum may be used with somewhat less favorable results as they may affect the filament if they become deposited thereon. There is an advantage in using a heavy metal, such as tungsten, as the scouring action is more effective and rapid. The high melting point is also highly desirable, not only because there will be no melting of material which has lodged on the filament, but because a preliminary firing of the material may be made at temperatures comparable with the highest reached in the lamp and moisture may be thus effectively removed. Other features and advantages of my invention will be apparent from the following description of a species thereof and from the accompanying drawings.

In the drawings, Fig. 1 is an elevation of an electric incandescent lamp comprising my invention; and Fig. 2 is an elevation of the said lamp in another position and is partly in vertical section.

The electric incandescent lamp shown in Fig. 1 is of a well-known type used for projection purposes and is of the general type disclosed in Halvorson Patent No. 1,591,911. It comprises a coiled tungsten filament 10 supported upon leads, the portions 11 of which are usually of tungsten. As shown in Fig. 2, in this type of lamp, which is of high wattage and which contains a mixture of argon and nitrogen as a gas-filling, the leads at their seal portions are of tungsten and are separately sealed in the glass tubular extensions 12 of a stem having a flange 13 which is sealed to the bulb 14. The base 15 comprises pins 16 which receive and are united to the outer ends of the leads. Material such as asbestos 17 is usually packed around the leads in the tubular extensions 12. An exhaust

tube 18 is sealed to the stem so that one end thereof opens into the interior of the bulb when the stem is sealed thereto. The other end of the said exhaust tube remains open until after the tungsten powder is inserted and the lamp has been exhausted and filled with the nitrogen and argon gas after which it is sealed off at 19. The tungsten powder is indicated at 20. It is inserted before the exhaust by simply pouring the powder in through the open exhaust tube and a funnel may be conveniently used for this purpose. I have found that to get the best results, the tungsten powder should be coarser than 200 mesh. When the lamp is in the upright position, as shown in Fig. 2, the tungsten powder will collect at the bottom in the annular space 21 between the stem and the bulb neck.

During the operation of the lamp the inner bulb surface will become coated with a dark deposit which will gradually obscure the light and if not removed will ultimately render the lamp practically useless. The rate of this deposit accelerates on account of the fact that as it forms the temperature which the lamp reaches increases on account of absorption. This may ultimately cause the glass to de-vitrify.

According to my invention, the deposit on the inner surface of the bulb may be removed from time to time simply by turning the lamp to the position shown in Fig. 1 thus causing the tungsten powder to collect at the middle portion thereof, as shown in the drawings, and then rotating the lamp to cause the tungsten powder to scrape the deposit. This it will do very readily, one turn of the lamp being sufficient in many cases to effect the substantially complete removal of the deposit. This is due to the fact that the tungsten is a very heavy metal and as the bulb is turned, the pressure on the deposit is considerable. In gas-filled lamps, the deposit appears to be less firmly attached to the bulb surface than in vacuum lamps. During the removal of the deposit, if any of the powder should become deposited on the filament, there is no injurious result on account of the highly refractory character of the powder. I have found that for a five and ten kilowatt electric incandescent lamp of the type shown, about seven cubic centimeters of tungsten powder is sufficient, while for the three kilowatt and fifteen hundred watt lamps, about three cubic centimeters is sufficient.

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

1. In an electric lamp or similar device comprising a translation element which is heated to high temperature during operation and which is enclosed in a hermetically sealed transparent container, a deposit removing means consisting of loose granules of a highly refractory material of substantially the same composition as the said translation element.

2. In an electric lamp or similar device comprising an energy translation element composed substantially of tungsten and enclosed in a hermetically sealed transparent container, a deposit removing means consisting of loose granules of a highly refractory material comprising tungsten.

3. In an electric incandescent lamp comprising a highly refractory filament enclosed in a hermetically sealed transparent container, a deposit removing means consisting of loose granules of a highly refractory material of substantially the same composition as the said filament.

4. In an electric incandescent lamp comprising a tungsten filament enclosed in a hermetically sealed transparent container, a deposit removing means consisting of loose granules of tungsten.

In witness whereof, I have hereunto set my hand this 15th day of February, 1929.

DANIEL K. WRIGHT.