PATENT SPECIFICATION

Application Date: Nov. 23, 1940. No. 16839/40.

545,506

Complete Specification Left: Nov. 21, 1941.

Complete Specification Accepted: May 29, 1942.

PROVISIONAL SPECIFICATION

Improvements in or relating to Electric Glow Discharge Lamps

We, UNION LAMP AND LIGHTING COMPANY, LIMITED, of Union Lamp Works, Abbeydale Road, Wembley, in the County of Middlesex, a Company registered under the laws of Great Britain, and ALBERT EDWARD ALEXANDER FARLEN, a British subject, of the Company's address, do hereby declare the nature of this invention to be as follows:—

This invention relates to electric glow discharge lamps and more particularly to such lamps for operation on ordinary supply voltages.

With electric glow discharge lamps as commonly employed at present, an orange or yellowish light of poor intensity is yielded, the consumption being usually of the order of 5 watts.

The main object of the present invention is to provide improved constructions of such lamps of low consumption, e.g. of the order of 1 to 2 watts, such lamps yielding either red, pink or near-white light of increased intensity, and being of simple but robust construction.

A further object is to provide such lamps the glow from which is the same irrespective of whether D.C. or A.C. is employed and in the former case irrespective of polarity.

The invention consists in an electric glow discharge lamp the electrode surface or surfaces on one electrode being identical with the electrode surface or surfaces on the other electrode and all electrode surfaces being coated with a highly conductive substance.

The invention also consists in an electric glow discharge lamp as set forth in the preceding paragraph, wherein said highly conductive substance is composed of an alkaline earth metal, preferably barium.

The invention also consists in an electric glow discharge lamp as set forth in either of the two preceding paragraphs wherein, said electrode surfaces are each comprised by the surfaces of one or more rectangular plates.

The invention also consists in an electric glow lamp as set forth in any of the three preceding paragraphs wherein at least two electrode surfaces are provided for each electrode and the surfaces on one electrode are staggered in relation to those of the other electrode.

The invention also consists in an electric glow discharge lamp as set forth in any of the preceding four paragraphs wherein the envelope is substantially exhausted of air but contains some inert gas, e.g. helium and/or neon.

The invention also consists in electric glow discharge lamps substantially as hereinafter described.

In carrying the invention into effect according to one form by way of example as applied to a lamp for giving a near-white light, we provide a pair of electrodes each of which comprises a nickel or iron wire to which is welded a pair of rectangular plates of nickel or iron.

All the rectangular plates are identical but the pair on one electrode wire are staggered relatively to those on the other electrode wire.

Before the electrode wires are mounted in the usual glass pinch, the plates are painted with either barium hydroxide, strontium carbonate or calcium oxide and are then raised to white heat to bake the selected material on to the plates and to decompose alkaline earth metal compound so that either barium, strontium or calcium, as the case may be, is formed on the surface of the plates.

The assembly is then mounted in a glass envelope and the latter evacuated. Commercial argon gas is then admitted until a pressure of between 1 and 4 mm is reached and a high voltage of 2500 volts is applied between the electrodes, thus causing a current of about 50 milliamps to flow, resulting in the electrodes attaining red heat.

The argon gas cleans or de-gases the electrodes, thus tending to remove traces of foreign bodies that may have collected on the electrodes, e.g. from the atmosphere. The same applies to the interior of the envelope.

A further evacuation of the envelope is now made after which helium gas is admitted until a pressure of between about 1 and 5 mm. of mercury is reached.

It is preferred to incorporate a resistance of suitable value in the circuit of

the lamp to reduce the consumption to about 1 to 2 watts and in these circumstances the lamp yields a slightly-blue white light of substantial intensity.

The staggering of the electrode surfaces gives a more efficient distribution of light than would be obtained if these surfaces were disposed directly opposite one another.

If a red glow be desired, traces of neon gas are admitted instead of helium whilst if a pinkish glow be desired traces of neon gas are added to the helium.

Lamps constructed in accordance with the present invention may be operated on either A.C. or D.C.; their minimum striking voltage is of the order of about 150 volts.

Dated this 23rd day of November, 1940.

MARKS & CLERK.

COMPLETE SPECIFICATION

Improvements in or relating to Electric Glow Discharge Lamps

We, UNION LAMP AND LIGHTING COMPANY, LIMITED, of Union Lamp Works, Abbeydale Road, Wembley, in the County of Middlesex, a Company registered under the laws of Great Britain, and ALBERT EDWARD ALEXANDER FARLEN, a British subject, of the Company's address, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to electric glow discharge lamps and more particularly to such lamps for operation on ordinary supply voltages.

With electric glow discharge lamps as commonly employed at present, the consumption of which is usually limited to about 5 watts by the employment of a series resistance, a light of poor concentration is yielded which is orange or yellowish in dependance on the gas filling employed.

The main object of the present invention is to provide improved constructions of such lamps of low consumption, e.g., of the order of 1 to 2 watts, such lamps yielding either red, pink or near-white light of increased concentration and being of simple but robust construction.

A further object is to provide such lamps the appearance from which is the same irrespective of polarity even when D.C. is employed for operating them.

The invention consists in an electric glow discharge lamp the electrode member or members of both electrodes of which comprise rectangular plates of the same or substantially the same size, the surfaces of which are coated with a highly emissive substance in which the electrode member or members of one electrode are staggered in relation to that or those of the other electrode.

The invention also consists in an electric glow discharge lamp as set forth in the preceding paragraph, wherein the containing envelope is substantially exhausted of air but contains some inert gas, e.g. helium and/or neon.

The invention also consists in an electric glow discharge lamp substantially as hereinbefore described with reference to the accompanying drawings.

Referring to the accompanying diagrammatic drawings:—

Figure 1 is a front view of part of a lamp of one convenient form embodying the present invention, and

Figure 2 is a side sectional elevation thereof.

In carrying the invention into effect according to the form illustrated by way of example in Figures 1 and 2 as applied to a 230 to 250 volt lamp for giving a near-white light, we provide a pair of electrodes in two different planes each of which electrodes comprises a nickel or iron wire *a* to which is welded a pair of rectangular metal plates *b b* of iron.

All the rectangular plates are identical but the pair on one electrode wire are staggered relatively to those on the other electrode wire, that is, are not directly opposite one another.

Before the electrode wires are mounted in the usual glass pinch *c*, the plates are painted with either barium hydroxide, strontium carbonate or calcium oxide and are then raised to white heat in a flame in air to bake the selected material on to the plates and to decompose the alkaline earth metal compound so that either barium oxide, strontium oxide or calcium oxide, as the case may be, is left adhering to the surfaces of the plates.

The assembly is then mounted in a glass envelope and the latter evacuated. Commercial argon gas is then admitted until a pressure of between 1 and 4 mm. of mercury is reached and a voltage of 2500 volts is applied between the electrodes. By adjusting the current to about 50 milliamps the electrodes attain a red heat and the argon gas cleans or de-gases the electrodes, thus tending to remove traces of foreign bodies that may have collected on

the electrodes, e.g from the atmosphere. The same applies to the interior of the envelope.

A further evacuation of the envelope is now made after which helium gas is admitted until a pressure of between about 1 and 8 mm. of mercury is reached.

A series resistance *d* of suitable value is connected in the circuit of the lamp to reduce the consumption to about 1 to 2 watts and a cap *c* is cemented to the envelope. Such a lamp yields a slightly-blue white light of concentrated intensity.

The staggering of the electrode members gives an increased concentration of light due to the appearance of a continuous source.

The lamp has a striking voltage of the order of 150 volts and it may be operated on either A.C. or D.C. When operated on D.C. the glow produced is similar irrespective of the polarity.

If a red glow be desired, traces of neon gas are admitted instead of helium whilst if a pinkish glow be desired traces of neon gas are added to the helium.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An electric glow discharge lamp the electrode member or members of both electrodes of which comprise rectangular plates of the same or substantially the same size, the surfaces of which are coated with a highly emissive substance in which the electrode member or members of one electrode are staggered in relation to that or those of the other electrode.

2. An electric glow discharge lamp as claimed in Claim 1, wherein the containing envelope is substantially exhausted of air but contains some inert gas, e.g. helium and/or neon.

3. An electric glow discharge lamp substantially as hereinbefore described with reference to the accompanying drawings.

Dated this 21st day of November, 1941.

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Leamington Spa: Printed for His Majesty's Stationery Office, by the Courier Press.—1942.

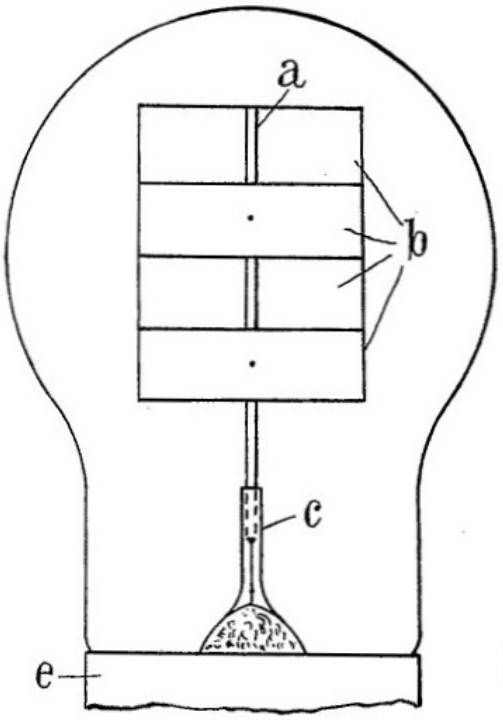

FIG. 1.

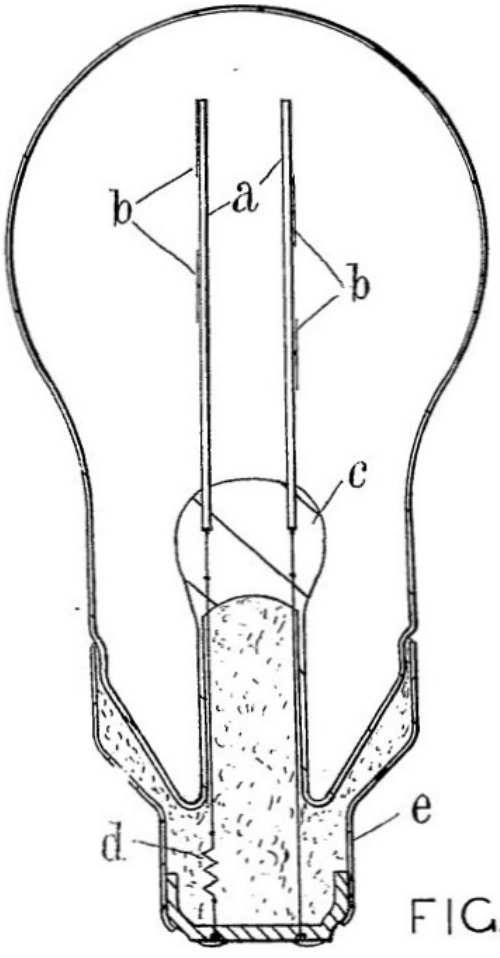

FIG. 2.

Malby & Sons, Photo-Litho.