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(54) IMPROVED ELECTRIC LAMPS AND THEIR PRODUCTION

(71) We, THORN ELECTRICAL INDUSTRIES LIMITED, a British Company, of Thorn House, Upper Saint Martin's Lane, London WC2H 9ED, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to electric lamps containing metal halides, and more especially to metal halide discharge lamps.

Metal halide lamps are more difficult to exhaust in the course of production than the corresponding plain mercury discharge lamps, mainly because the metal halides are hygroscopic. Traces of water vapour are consequently difficult to eliminate from the finished lamp and, because of the well known "water cycle", even a small trace of water has a serious effect on lamp life. The "water cycle" is described in the "Collected Works of Irving Langmuir", Volume 2, page 185 (Pergamon Press 1960).

The use of dry boxes in storing and weighing the metal halide doses and the heating and recondensing of the metal halides within the lamp envelope during the exhaust procedure are methods which have been used in attempts to eliminate traces of water vapour from the filling of the lamp.

However, a dry box, capable of holding the partial pressure of water vapour at the very low values required to keep the metal halides dry, is expensive to install and difficult to maintain. The heating and recondensing of the metal halides during the exhaust procedure is a hand operation and can result in a partial loss of the metal halide dose, particularly with smaller sizes of lamp. The elimination of this step would simplify the exhaust procedure and facilitate machine exhaust techniques.

It has now been found in accordance with this invention that similar lamp lives can be obtained from metal halide lamps without the use of either an expensive dry box or heating and condensing of the metal halide during the exhaust procedure simply

by including a small quantity of a metal phosphide in the lamp filling with the metal halide dose.

According to this invention, therefore, an electrical discharge lamp comprises a lamp envelope, electrodes and leads therefor and a vapour fill including metal halide and a quantity of metal phosphide effective to getter residual water vapour inside the envelope, preferably the phosphide of a metal also present as halide. Too much phosphorus added in this way will result in a dense coloured vapour when the lamp is operating, which will affect both the luminous efficacy and the colour of the light from the lamp. Less than 0.1 mg per cc of lamp envelope, calculated as phosphorus, and more especially less than 0.05 mg/cc phosphorus should preferably be added.

In one particular example of the practice of this invention a 400-watt high pressure mercury quartz compact source arc tube with metal additive (a so-called "C.S.I." lamp) was made, using gallium as the added metal.

In accordance with the invention, the normal 0.2 mg dose of gallium metal used in such a lamp was replaced by 0.3 mg of gallium phosphide and the normal heating and condensing of the metal halides during the exhaust procedure was omitted. Subsequent life tests showed no deterioration in performance as compared with the conventional C.S.I. lamp.

Gallium phosphide was used since gallium was already a constituent of the lamp filling and gallium phosphide is easily obtained in very pure form (from the semiconductor industry) and may be stored without special precautions.

The accompanying drawing is an elevational view of a discharge lamp which can incorporate a metal phosphide in accordance with the present invention.

The lamp shown in the drawing has a vitreous envelope 2 formed with a seal portion 3. Refractory metal electrodes 4 and 5 within the envelope are connected to molybdenum ribbons 6 and 7 within the

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sealed portion and the latter are connected to respective external lead-wires 8 and 9.

5 The fill within the envelope 2 includes mercury and a metal halide and in accordance with the invention an effective amount of metal phosphide is added, to gether residual water vapour inside the envelope, more especially moisture introduced with a metal halide.

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WHAT WE CLAIM IS:—

1. An electrical discharge lamp comprising a lamp envelope, electrodes and leads therefor and a vapour fill including metal halide and a quantity of metal phosphide effective to gether water vapour inside the envelope.

15 2. A lamp according to claim 1 wherein the phosphide is that of a metal that is also introduced into the lamp as a halide.

20 3. A lamp according to claim 1 or 2 wherein the metal phosphide provides a quantity of phosphorus of less than 0.1 mg per c.c. of lamp envelope volume.

25 4. A lamp according to claim 1, 2 or 3

wherein the lamp contains gallium halide and gallium phosphide.

5. A process for the manufacture of an electrical discharge lamp having a vapour fill including metal halide, wherein a quantity of a metal phosphide effective to gether residual water vapour is introduced into the lamp and, after sealing the said envelope, the lamp is operated to cause the phosphorus to gether the water vapour.

6. A process according to claim 5 wherein there are introduced into the envelope a halide and a phosphide of the same metal.

7. An electrical discharge lamp according to claim 1 as hereinbefore described.

8. A method of manufacturing an electrical discharge lamp in accordance with claim 5 substantially as hereinbefore described.

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COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale

