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L. H. SABINE
INDUCTION LAMP

2,803,774

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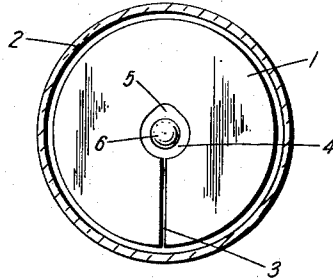


FIG. 1

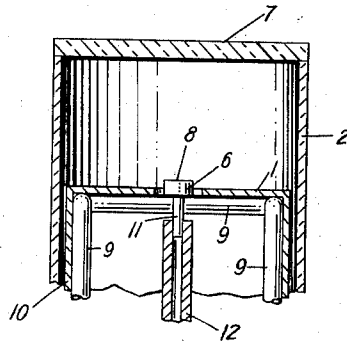


FIG. 2

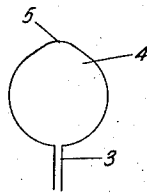


FIG. 3

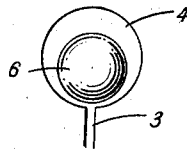


FIG. 4

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2,803,774

INDUCTION LAMP

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7 Claims. (Cl. 313-161)

This invention relates to induction lamps, that is to lamps in which a refractory body, called a target, is inductively heated to incandescence.

The heating is generally achieved by placing a coil around the refractory body and passing a high frequency current through the coil. A field concentrator is used between the target and the coil, the concentrator generally including an annular disc around the target but spaced from it. The disc has a radial slot to prevent circulation of currents in a complete ring around the target. The latter is generally a circular cylinder in shape, and is centrally located inside the central circular opening of the concentrator disc.

While such an arrangement gives a far more uniform light distribution than can be obtained from a coiled incandescent filament, the light output will nonetheless be smaller from the target area in the vicinity of the slot than it will be in other regions of the target. The brightness is about 20% less near the slot than it is on the diametrically opposite portion of the target. Such a variation is permissible for many purposes, but is undesirable in the printing of motion picture film, for example.

I have discovered that a much greater uniformity can be obtained by placing the target eccentrically in the concentrator opening, so that the target will be nearer to the circumference of the central opening near the radial slot than it is to the circumference at the opposite closed portion of the circumference. Such an arrangement is useful where the spacing between the target and circumference of the central opening does not become so small that crystal growth across it from the target will greatly shorten the life of the lamp.

I have further discovered that uniformity of brightness over the forward area of the target can be achieved by having the radius of curvature of the opening increase around the opening as the distance from the slot increases. The opening can be made oval in shape, so that it projects considerably outward from the base circle at a region diametrically opposite to the slot.

In addition, the slot should be made as narrow as possible, and the target set so that it extends somewhat beyond the plane of the concentrator disc in the direction of useful light emission, for best results.

Other objects, features and advantages of the invention will be apparent from the following specification, together with the accompanying drawing in which:

Fig. 1 is a plan view of concentrator and target, with a glass envelope around the same;

Fig. 2 is a side view thereof, in section;

Fig. 3 is an enlarged view of the central opening of the disc of Fig. 1; and

Fig. 4 is a view of a circular central opening with an eccentric target.

In Fig. 1, the concentrator disc 1 is inside but spaced from the tubular glass envelope 2, shown in section. The disc 1 has the narrow radial slot 3, terminating in an oval central opening 4, having the projecting "bump"

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or extension 5 diametrically opposite slot 3. The target 6 is a cylinder of refractory material such as tantalum carbide, set inside, but spaced from the opening 4 in the concentrator disc 1, and set at about the center of the base circle from which the "bump" 5 extends.

Fig. 2 shows the glass envelope 2 with its flat top portion 7, through which light from the front surface 8 of target 6 is emitted. The target 6 extends forward of the plane of the disc 1. Placing the target to extend forwardly in that manner further improves the uniformity of light output.

The hollow tubes 99 are attached to the cylindrical portion 10 extending downward from the concentrator disc 1 and in electrical contact therewith around the outer circumference of said disc. The stem 11, of smaller diameter but of the same material as target 6 is attached to the same and extends into the zirconium tube 12 which supports it as shown in copending application Serial No. 520,718, filed in the United States Patent Office on July 8, 1955 by Sandford C. Peek. The latter application also shows complete details of the construction of an induction lamp, the present application accordingly showing only such parts as are necessary to illustrate the improvement claimed herein.

The slot 3 should be made as narrow as possible without short circuiting or arcing, a width of about 1/32 inch being satisfactory with one embodiment of my device. In the same embodiment, the target has a diameter of 5/16 inch and depth of 3/8 inch. The opening 4 was based on a circle of 0.390 inch diameter, with the projection 5 extending to a distance of 0.400 inch from the circumference directly opposite at the slot. The target is set in the opening 4 with a slight eccentricity, so that distance from target edge to circumference of concentrator opening is 0.028 inch near the slot 3 and about 0.035 inch along a diameter perpendicular to the center line of the slot.

The projecting portion is rounded off to a circumference of 0.200 inch diameter, the other edges of the projection being tangent to the main circle and the 0.200 inch circle.

Fig. 3 shows a more enlarged portion of the concentrator disk 1, to indicate its shape in more detail.

In Fig. 4, the opening 4 is circular, and the target 6 is a circular cylinder, set eccentrically in said opening.

Although tantalum carbide, TaC has been given as an example of a target material, other sufficiently refractory materials, such as niobium carbide or hafnium carbide, can be used.

What I claim is:

1. An induction lamp comprising a refractory target, a magnetic field concentrator around said target, said concentrator having a central opening at a substantially greater distance from the outside rim of the target at some points on said rim than at others.

2. An induction lamp comprising a cylindrical refractory target, a magnetic-field concentrator around said target, said concentrator including a disc having a central generally oval opening therein, as distinguished from a circular opening, the target being inside said opening but spaced therefrom.

3. The combination of claim 2, in which the target has a substantial portion in front of the plane of said concentrator disc in the direction of useful high emission.

4. The combination of claim 2, in which the concentrator has radial slot of very narrow dimensions.

5. The combination of claim 2, in which the concentrator has a very narrow radial slot, and the opening has a major axis along the projection of said radial slot.

6. An induction lamp comprising a refractory target, a magnetic field concentrator around said target, said

concentrator having a central opening whose distance from the rim of the target increases as the distance from the slot increases.

7. An induction lamp comprising a refractory target, a magnetic field concentrator around said target, said 5
concentrator having a central opening said target being set in said opening eccentrically but spaced from it.

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