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ARC INCANDESCENT LAMP

Filed March 14, 1923

FIG. 1 .

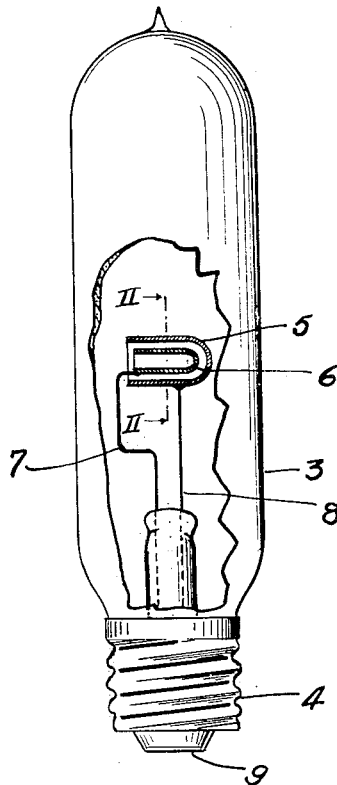
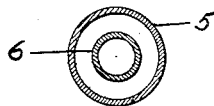


FIG. 2 .



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ARC INCANDESCENT LAMP.

Application filed March 14, 1923. Serial No. 634,914.

This invention relates to electric incandescent lamps, and more particularly to lamps of this character adapted for projection purposes.

5 An object of my invention is to provide an electric lamp having a plurality of electrodes designed and disposed with respect to each other to produce black-body radiation.

10 A further object of my invention is to provide an electric lamp for projection purposes which has its electrodes designed and arranged with respect to each other to avoid heat losses from one of the electrodes through convection and conduction.

15 A further object of my invention is to provide an electric lamp for projection purposes in which the electrodes are arranged with respect to each other to utilize the heat radiated from one electrode to again serve to heat that electrode.

20 A further object of my invention is to provide an electric lamp for projection purposes having at least one cup-shaped electrode having its open end facing the direction in which the light is projected.

Other objects of the invention will be apparent as the description proceeds.

Referring to the drawing:

25 Fig. 1 is a view in elevation, partly broken away, of a projection lamp, the electrodes being illustrated in longitudinal section.

Fig. 2 is an enlarged transverse cross-sectional view on line II—II of Fig. 1.

30 The embodiment of my invention illustrated in the drawings, may comprise a transparent envelope 3, having a base 4 of standard design. The shape of the envelope or bulb 3, may simulate the design of the bulb employed in projection lamps of standard make, that is, it may be of cylindrical or tubular shape.

35 Within the envelope 3, are a plurality of electrodes 5 and 6 of a special design and arrangement, which will be described more fully hereinafter. The electrodes are connected to, and supported by, leading-in wires 7 and 8, respectively, which latter are connected to a source of current, through the base 4 and center contact 9. The electrodes 5 and 6 may be additionally supported by auxiliary members (not illustrated) if desired.

Each of the electrodes may be formed of a refractory material, such as tungsten, and

the like, which may be heated to incandescence upon passage of an electrical discharge therebetween. 55

The walls of the electrodes are of sufficient weight, particularly the inner electrode, which should, preferably be not less than $\frac{3}{8}$ inch in thickness, in order to facilitate heat conduction from the hotter to the cooler parts to aid in equalizing temperature conditions in the electrodes. 60

In order to prevent the dissipation of heat and provide a construction which utilizes the black body effect, the electrodes may be in the form of hollow bodies of cup-shape or other desired configuration, nested within, but out of contact with, each other. The advantage of this construction, is that, because of one of the ends of the electrodes being closed, the circulation of the gases within the envelope over the inner surface of the outer electrode and the surfaces of the inner electrode is reduced to a considerable degree, thus reducing the dissipation of heat by convection. The nesting of one body within the other, provides a muffle arrangement of electrodes, whereby heat, in the form of light or radiant energy radiated outwardly from the inner electrode, is reflected backwardly by the walls of the outer electrode, while heat from the outer electrode is radiated toward the inner electrode. The inner electrode may, in this manner, be heated to a much higher temperature than the outer electrode. The black-body effect is obtained through the reflections of light within the inner electrode, which produces a higher intrinsic brightness. 65 70 75 80 85

The spacing of the electrodes from each other, may preferably be of the order of $\frac{1}{2}$ inch. However, this value may be varied, depending upon the nature of the gas, the pressure thereof, and the electrode material employed, etc. 90 95

The black-body effect may be advantageously utilized by placing the open ends of the electrodes facing the direction in which the light is projected. The reflections of light at the various portions of the inner surface of the inner electrode increase the brightness, and thus the black-body effect is obtained. 100

A suitable gas, inert with respect to the electrode material, may be employed within the envelope 3 as a gaseous atmosphere or 105

an inert environment. For example, argon, nitrogen, or a mixture of these gases, neon, helium, and other gases or mixtures thereof, may be utilized. The pressure of the gas is preferably less than atmospheric, desirably in the neighborhood of 600 mm. of mercury.

To start the lamp and maintain its operation until moderate incandescence is attained, a voltage sufficiently higher than the running voltage may be applied by auxiliary apparatus, such as is obvious to those skilled in the art.

The present invention is not intended for a lamp in which the primary consideration is a high-lumens-per-watt output, but, preferably, for one in which the important factor is high intrinsic brilliancy of a radiating area. It is appreciated that, in the present device, the outer electrode is not radiating efficiently from a lumens-per-watt standpoint, but the arrangement and construction of electrodes is such, that the primary object of the invention is attained, owing to the high temperature at which the inner electrode is maintained, and also by reason of its shape in approaching the attainment of a black-body condition.

Although I have illustrated the electrodes as being formed of cup-shape or thimble-shape bodies, it is apparent that other shapes may be substituted without departing from the spirit and scope of the invention, as defined in the accompanying claims.

What is claimed is:

1. An electric arc lamp comprising a sealed envelope, a filling of neutral gas therein, discharge electrodes of refractory material within said envelope, at least one electrode being composed of a cup-shape body and being so disposed with respect to the other electrode that the discharge therebetween results in heating the cup-shape electrode to incandescence, the cup-shape electrode being disposed in said envelope so as to radiate light rays from the interior of said body through the open end thereof.

2. An electric arc lamp comprising a sealed envelope, a filling of neutral gas

therein, a plurality of nested spaced-apart cup-shape electrodes within said envelope, said electrodes being disposed with respect to each other so that the discharge therebetween results in heating said electrodes to incandescence, the inner electrode being so disposed as to radiate light rays from the interior surface of said body through the open end thereof.

3. An electric arc lamp comprising a sealed envelope, a filling of neutral gas therein, discharge electrodes of refractory material within said envelope, the discharge-heated surface of at least one of said electrodes constituting the inner wall of an open chamber and being disposed so as to radiate light rays from the interior of said chamber through the opening.

4. An electric arc lamp comprising a sealed envelope, a filling of neutral gas, a chambered discharge electrode having an opening and a cooperating electrode in operative relation thereto, said electrodes being arranged to radiate light rays from the interior of the chamber through the opening in said chambered electrode.

5. An electric arc lamp comprising a sealed envelope, a filling of neutral gas therein, concentrically disposed electrodes adapted to support by incandescence an arc discharge within said envelope, at least one of said electrodes constituting an open chamber from the interior of which light rays produced by the arc discharge are radiated.

6. An electric arc lamp comprising a sealed envelope, a filling of neutral gas therein, two fixed electrodes of tungsten adapted to support by incandescence an arc-discharge, at least one of said electrodes constituting an open chamber and being disposed to radiate light rays through the opening in said chamber from the inner wall thereof.

In testimony whereof, I have hereunto subscribed my name this 13th day of March, 1923.

CHARLES FREDERICK LORENZ.