

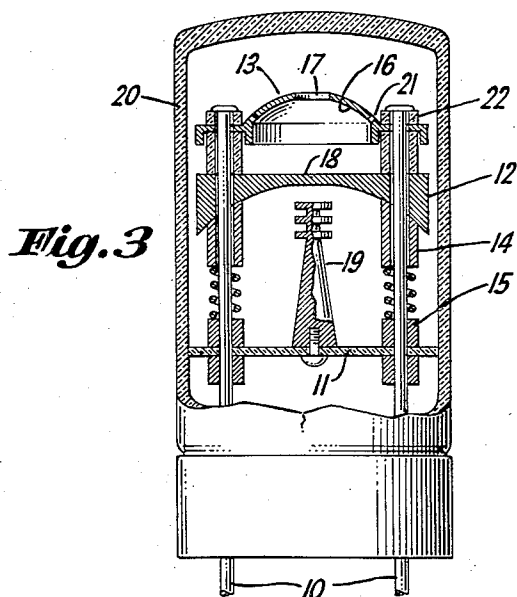
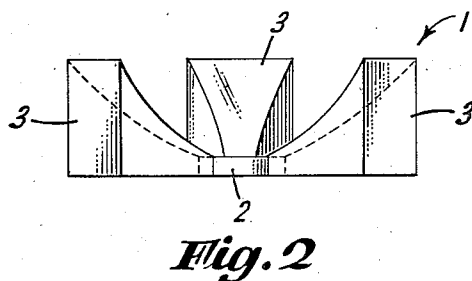
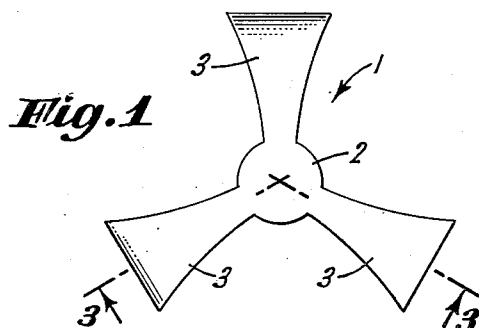
March 18, 1958

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2,827,587

HIGH INTENSITY PROJECTION LAMP

Filed March 21, 1955



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HIGH INTENSITY PROJECTION LAMP

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Application March 21, 1955, Serial No. 495,528

4 Claims. (Cl. 313—341)

My invention relates to light producing devices.

In many phases of the lighting industry, and particularly in those portions of the industry which are concerned with the production of light sources for motion picture projectors, search lights and the like, it is necessary to provide a quasi-point source of high intensity light in which the visible light spectra approximates that of the sun. Conventionally, a carbon or zirconium arc is used for this purpose. The apparatus required for the production of such an arc is complex and expensive; it must be supplied with power by special generators; it must be operated by highly skilled technicians.

I have devised a new type of lamp for use in applications of the above type which does not use an arc. This lamp can be supplied with power directly from a power line and no special generators or similar equipment is required. Moreover, this lamp can be operated automatically and no attendants or operators need be used.

Accordingly, it is an object of the invention to eliminate the use of carbon or zirconium arcs in the production of high intensity light.

Another object is to provide a new high intensity light source which does not use an arc.

Still another object is to provide a new high intensity lamp which operates on conventional single phase or multiphase alternating current.

Yet another object is to provide a new high intensity lamp in which an electrically heated refractory element is used as a light source.

A further object is to use incandescent refractory elements as high temperature sources of high intensity light.

Still a further object is to replace carbon or zirconium arcs with a light source formed from a refractory element electrically heated to temperatures on the order of thousands of degrees Kelvin.

Yet a further object is to provide a new refractory element light source which is electrically heated to very high temperatures, the electrical energy being supplied from a conventional single phase or multiphase source of alternating current.

These and other objects of the invention will either be explained or will become apparent to those skilled in the art when this specification is studied in conjunction with the accompanying drawings wherein:

Fig. 1 is a top view of a preferred embodiment of a refractory element light source in accordance with my invention;

Fig. 2 is a side view of this element; and

Fig. 3 is a cross sectional side view of a lamp assembly incorporating the element shown in Figs. 1 and 2.

In my invention, a refractory element having a thin disc-like center portion and two or more equidistantly spaced legs attached thereto is used as a light source. Current is supplied through the legs to the center portion to raise the temperature of the disc to such a value (ranging upward to about 4500° K.) that the disc becomes a light source. At these operating temperatures, the spectra

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of the emitted light approximates that of a carbon or zirconium arc.

Two legs are required for a single phase current source; three legs are required for a three phase current source; 5 for other types of sources such as a six phase system the number of legs must be increased accordingly.

The legs must be shaped so that their cross sectional area increases with increasing distance from the center. This type of construction is necessary both to increase 10 the ratio of disc to leg resistance, thereby concentrating the power consumption in the region of the disc, and to control the temperature gradient between the disc and legs in such a manner that the variation is gradual, thus preventing strains, crack formation and other undesirable 15 surface and structural changes.

The element can be formed from one or more conventional high purity refractory materials such as tungsten, the carbides of tantalum, zirconium and hafnium and the like. These materials tend to oxidize rapidly and fail in 20 oxygen-containing atmosphere. Consequently, the element is operated in an oxygen free atmosphere such as argon or other inert gas or a vacuum.

The element can be mounted within a glass, quartz or 25 vycor envelope and operated in an oxygen free atmosphere.

Electric power can be supplied from a conventional 60 cycle alternating current source; however, higher frequencies can be used if desired.

The element and the surrounding envelope containing 30 built-in reflectors and an aperture mask can be assembled within a mounting support to form an integral lamp as described in more detail below.

Referring now to the drawing, Figs. 1 and 2 show a refractory element identified generally at 1 and provided 35 with a thin disc-like center portion 2 and a plurality of legs 3 extending outward from the center portion. The element illustrated is adapted for three phase current operation so that three equidistantly spaced legs are required. The number of legs required depends upon the number of 40 phases used. For example, single phase operation would necessitate the use of two equidistantly spaced legs. It will be apparent that the cross sectional area of each leg increases with increasing distance from the center portion so that the electrical resistance of the center portion is 45 much higher than that of the legs and the power consumption is concentrated in the center portion of the element. Moreover, this construction permits control of the temperature gradient in the manner previously described.

Fig. 3 is a cross section of a lamp assembly adapted for 50 single phase operation. Two tungsten or other high temperature resistant conducting leads 10 extend through corresponding openings in an insulating support member 11, a single phase refractor element 12, and an insulated mask 13. The ends of leads adjacent the mask are swaged 55 and are separated from the mask by insulating spacers 22. Element 12 and support member 11 are separated from each other by tungsten, nickel or molybdenum sleeves 14 and 15 which fit tightly around corresponding portions of leads 10. Sleeves 14 and 15 are connected to 60 each other by tungsten or molybdenum springs. Sleeves 14 are free to move as thermal expansion takes place. Sleeves 15 are affixed, for example, by spot welding, to the tungsten leads.

Mask 13 has an inner light reflecting surface 16 and a 65 light aperture 17 mounted directly over the disc like portion 18 of element 12. Secured to the support member 11 and mounted below the disc portion 18 is a triple light reflector 19. The purpose of the reflectors and mask reflecting surface is to reflect as much radiant energy as 70 possible back into the hot zone surrounding the disc. The aperture 17 is placed in front of the disc to concentrate the light into a small area and to insure that only the

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light from the disc is transmitted. The disc is at a substantially uniform temperature and the light emitted therefrom has a uniform spectra characteristic. Light from various portions of the legs has a variable spectra characteristic and would deleteriously affect the quality of light produced by the lamp.

The entire assembly is mounted within a gas filled or evacuated envelope 20 as previously indicated.

Because of the high operating temperatures used, material will be evaporated from the surface of element 12 and will tend to deposit on the inner surface of the envelope. In some cases, such deposition can result in impaired light transmission properties of the envelope. However, if the periphery of mask 13 is provided with holes 21, and a gas filled envelope is used, conventional currents set up within the hot gas will cause the gas to circulate through the holes 21 and reduce the chimneying of the gas (with entrained particles of evaporated material) through the aperture and thus minimize the material deposition on the section of the envelope used for the transmission of light.

While I have shown and described and pointed out my invention as applied above, it will be apparent to those skilled in the art that many modifications can be made within the scope and sphere of my invention as defined in the claims which follow.

What is claimed is:

1. An integral solid element formed from refractory material, said element being provided with a single thin

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disc like center portion and a plurality of equidistantly spaced legs extending from said portion, the cross sectional area of each leg increasing with increasing distance from the center portion, the flat surface of said central portion being substantially coplanar with the top surface of each of said legs.

2. An integral solid light source formed from refractory material, said source being provided with a single disc like center portion and a plurality of equidistantly spaced legs extending from said center portion, the electrical resistance of the center portion being much larger than that of the legs, the flat surface of said central portion being substantially coplanar with the top surface of each of said legs.

3. An integral solid light source as set forth in claim 2, wherein said plurality is equal to 2.

4. An integral solid light source as set forth in claim 2, wherein said plurality is equal to 3.

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