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HIGH-INTENSITY AIR-COOLED ELECTRIC LAMP ASSEMBLY

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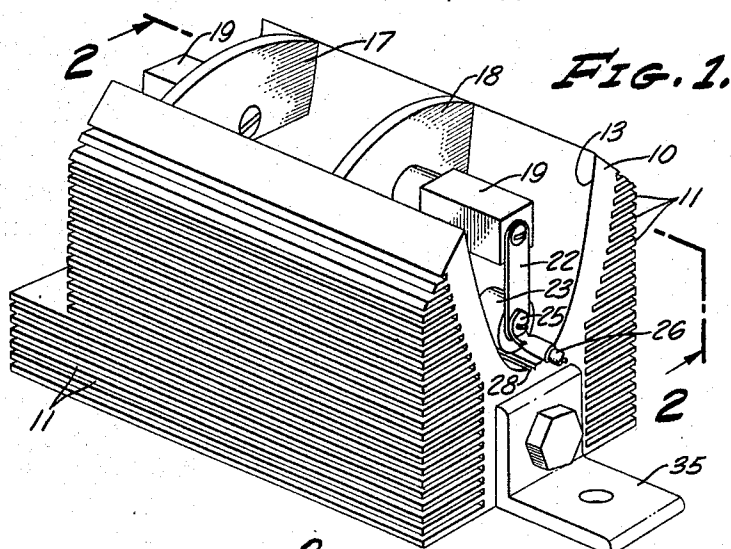


FIG. 1.

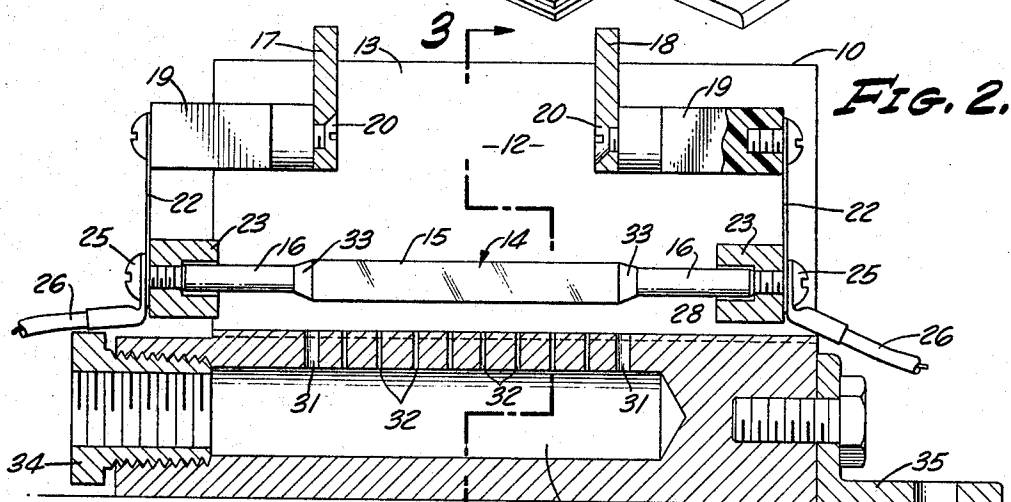


FIG. 2.

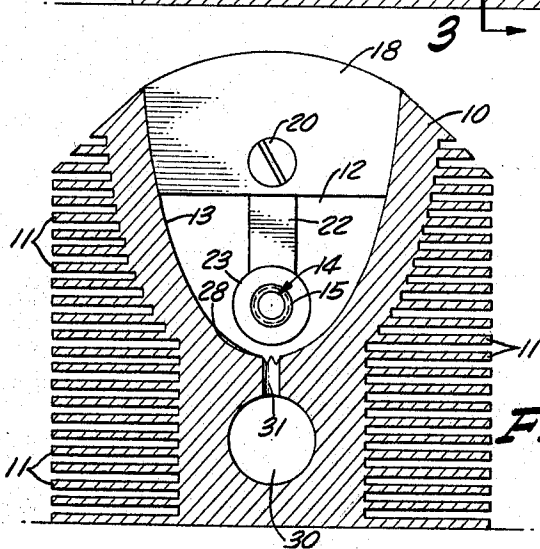


FIG. 3.

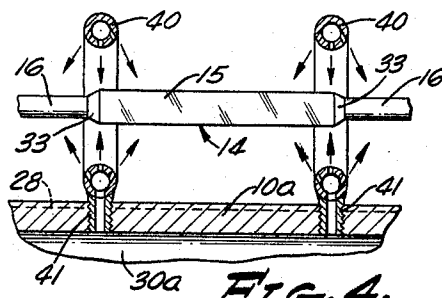


FIG. 4.

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## HIGH-INTENSITY AIR-COOLED ELECTRIC LAMP ASSEMBLY

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5 Claims. (Cl. 240—47)

This invention relates to high-intensity lamps and is particularly directed to an air-cooled lamp assembly employing a high-pressure mercury vapor lamp. Such a device finds particular usefulness in connection with photographic printing of motion picture film, but this is by way of example and not of limitation.

High-intensity electric lamps of the type employing high-pressure mercury vapor have heretofore required liquid cooling in order to dissipate the intense heat generated by the lamp, but the passage of the liquid coolant around the lamp has required that the usable light pass through the coolant stream, thereby reducing the light intensity.

It is a principal object of the present invention to provide an air-cooled or gas-cooled high-intensity lamp assembly so that the intensity of light developed by the lamp is not materially reduced in passing through the stream of air or gas which acts as the coolant.

Another object is to provide a novel form of air-cooled lamp house for use with a high-intensity electric lamp employing a straight transparent tube or envelope containing high-pressure mercury vapor.

Other and more detailed objects and advantages will appear hereinafter.

In the drawings:

FIGURE 1 is a perspective view showing a preferred embodiment of this invention.

FIGURE 2 is a sectional elevation taken substantially on the lines 2—2 as shown in FIGURE 1.

FIGURE 3 is a transverse sectional elevation taken substantially on the lines 3—3 as shown in FIGURE 2.

FIGURE 4 is a longitudinal sectional view partially broken away showing a modification.

Referring to the drawings, the housing 10 is formed of aluminum alloy or other material having a good thermal conductivity and is provided with a large number of integral cooling fins 11. A cavity 12 in the housing extends axially for the full length thereof. This cavity is bounded by a reflector surface 13, having a cross-section shape such as, for example, an ellipse proportioned to cause light to be emitted from the cavity 12 in a predetermined pattern. The lamp 14 is placed at a focal point of the ellipse, and preferably comprises a high-pressure mercury arc lamp. Lamps of this type may be obtained from PEK Labs, Inc., of Palo Alto, California. A pair of bridge elements 17 and 18 are fixed on the housing 10 and extend across the open portion of the cavity 12. Each bridge element supports an insulator block 19 by means of a threaded fastening 20. Each insulator block, in turn, supports a lamp socket 23 by means of a resilient metallic connector 22. These connectors 22 can be spread apart sufficiently to permit insertion of the lamp terminals 16 into the sockets 23. The threaded elements 25 serve to establish electrical contact between the electrical lead wires 26 and the lamp terminals 16.

The transparent envelope 15 of the lamp 14 is preferably positioned symmetrically between the bridge elements 17 and 18, so that the major portion of light emitted by the lamp 14 passes out of the cavity 12 between the bridge elements 17 and 18, and the latter may be proportioned and shaped for assembly with respect to a motion-picture printer device, not shown. It is desirable to

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coat the reflector surface 13 in the vicinity of the lamp envelope 15 with dichroic material in the manner disclosed in the Strawick Patent No. 3,099,403, in order that most of the visible light spectrum be reflected while most of the invisible radiant energy and heat be transmitted into the material of the housing 10. One or more axial grooves 28 are provided in the reflecting surface 13 at the base of the cavity 12 in order to minimize reflection of radiant energy back into the transparent envelope 15.

Means are provided for cooling the lamp housing 10 and for cooling the lamp terminal 16, and as shown in the drawings this means includes an air chamber 30 formed in the housing 10 and connected by a row of lateral ports 31 and 32 to the cavity 12. The ports 31 are larger than the others and are directed to cause jets of air or other gaseous coolant to flow from the chamber 30 against the joints 33 between the transparent envelope 15 and the metallic terminal 16. The other ports 32 are directed to cause jets of gaseous fluid to flow from the chamber 30 against the transparent envelope itself. A supply pipe (not shown) for air or other gaseous coolant is connected to the chamber 30 by means of the threaded connector element 34. A fan (not shown) is provided for directing a blast of air axially along the outer surface of the housing 10 along the cooling fins 11 to extract heat as rapidly as possible from the housing 10. The bracket 35 is used for mounting the housing 10 on the motion-picture printer device, not shown.

In the modified form of my invention shown in FIGURE 4, annular cooling rings 40 are provided for directing air other than gaseous coolant against the transparent envelope 15 of the high-intensity lamp 14, as well as against the metal terminal 16 and joints 33. The cooling rings 40 are threaded into the housing 10a by means of hollow threaded elements 41 which connect the chamber 30a to the interior of each of the cooling rings 40. The cooling rings 40 are substantially aligned with the bridge elements 17 and 18.

Having fully described my invention, it is to be understood that I am not to be limited to the details herein set forth but that my invention is of the full scope of the appended claims.

What is claimed is:

1. For use with a high intensity electric lamp having a cylindrical transparent envelope positioned between axially extending metallic terminals, a lamp housing assembly having in combination: a housing provided with an axial extending cavity for reception of the electric lamp, the cavity having walls defining a reflector surface, said reflector surface having a dichroic coating at least in the region adjacent the electric lamp, means including sockets for engaging the lamp terminals and establishing electrical connection to them, the electric lamp being supported by said sockets axially of said cavity, the housing having at least one axial groove positioned symmetrically of said reflector surface for minimizing reflection back into said electric lamp, the housing having a chamber therein, means for delivering a gaseous coolant into said chamber, and means connected to said chamber for directing coolant against said electric lamp.

2. A lamp housing assembly for high intensity electric lamps of the type having a cylindrical transparent envelope positioned between coaxially disposed metallic terminals, said lamp housing assembly comprising: a housing block formed of metal having high heat conductivity and defining a cavity of essentially parabolic cross section and having a focal axis extending the length of the housing block, said housing block having a plurality of integral cooling fins extending from opposite sides thereof; means for supporting said electric lamp by its terminals at the focal axis of said cavity; a dichroic coating on at least

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selected portions of the surface of said cavity for transfer of radiant energy, principally in an invisible spectrum, into said housing block for conduction to said cooling fins; and means for passage of a cooling fluid including a passage formed in said housing block parallel to the focal axis of said housing, and orifices communicating with said passage and directed toward said lamp.

3. A lamp housing according to claim 2, wherein said orifices are arranged in a row defining a plane passing through the focal axis of said cavity.

4. A lamp housing according to claim 2 wherein a pair of tubular rings communicating with said passage surround the terminals of said electric lamp and said orifices are formed in said rings and are directed radially inwardly toward said electric lamp.

5. A lamp housing assembly for high intensity electric lamps of the type having a cylindrical transparent envelope positioned between coaxially disposed metallic terminals, said lamp housing assembly comprising: a housing block formed of metal having high heat conductivity and defining a cavity of essentially parabolic cross section and having a focal axis extending the length of the housing block, said housing block having a plurality of integral cooling fins extending from opposite sides thereof, a pair

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of parallel plates bridged between opposite walls of said cavity outwardly from the focal axis thereof, connectors supported from said plates extending toward said focal axis to support said electric lamp by its terminals at said focal axis, a dichroic coating on at least selected portions of the surface of said cavity for transfer of radiant energy, principally in an invisible spectrum, into said housing for conduction to said cooling fins; and means for passage of a cooling fluid including a passage formed in said housing block parallel to the focal axis of said housing, and orifices communicating with said passage and directed toward said lamp.

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