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[54] **COOLING SYSTEM FOR XENON ARC LAMPS**

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[52] **U.S. Cl.** **240/47,** 352/202, 353/61

[51] **Int. Cl.** **F21v 29/00**

[58] **Field of Search** 240/47; 352/202; 353/52, 353/57, 61

[56] **References Cited**

UNITED STATES PATENTS

3,188,459	6/1965	Bridwell	240/47
3,305,680	2/1967	Berkl	240/47
3,465,140	9/1969	Goldsmith	240/47 X
3,559,816	2/1971	Hirata	240/47 X
3,626,176	12/1971	Tsugami	353/61 X
3,700,881	10/1972	Slomski	240/41.35 R
3,703,635	11/1972	Burkarth	240/41.35 R

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[57] **ABSTRACT**

A cooling system for lamps, such as Xenon arc lamps used in motion picture projectors, where the lamp is elongate with a terminal and seal at each end, with one terminal and seal mounted within the mirror and thereby subjected to excessive heating. A concentric sleeve construction for the seal within the mirror and an air supply duct providing cooling air flow diectly about the seal and protecting the seal from reflected radiation.

3 Claims, 4 Drawing Figures

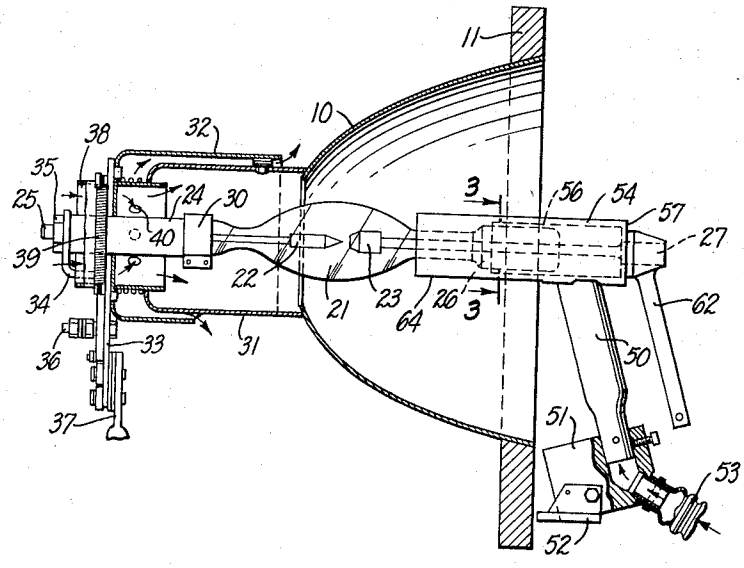


FIG. 1.

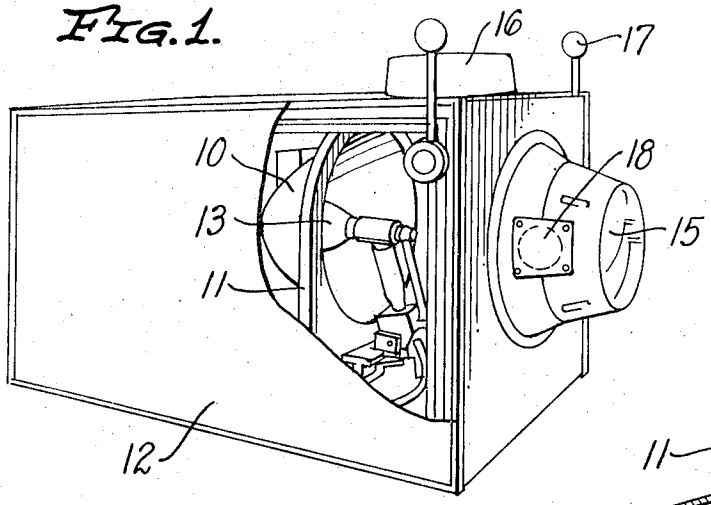


FIG. 3.

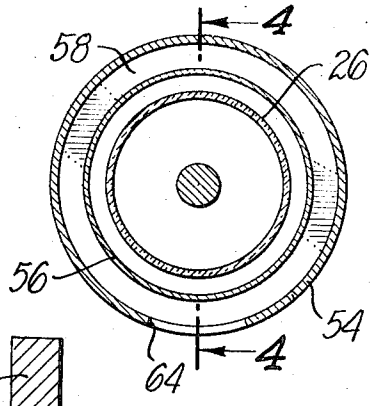


FIG. 2.

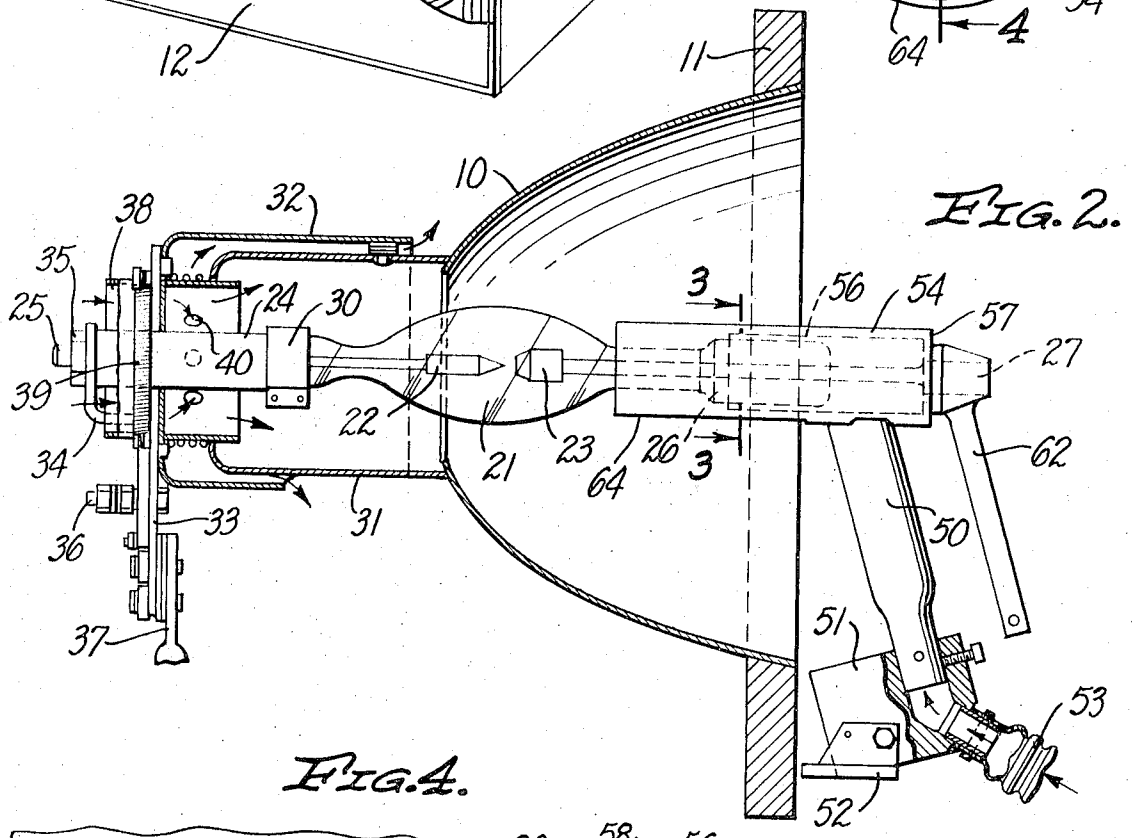
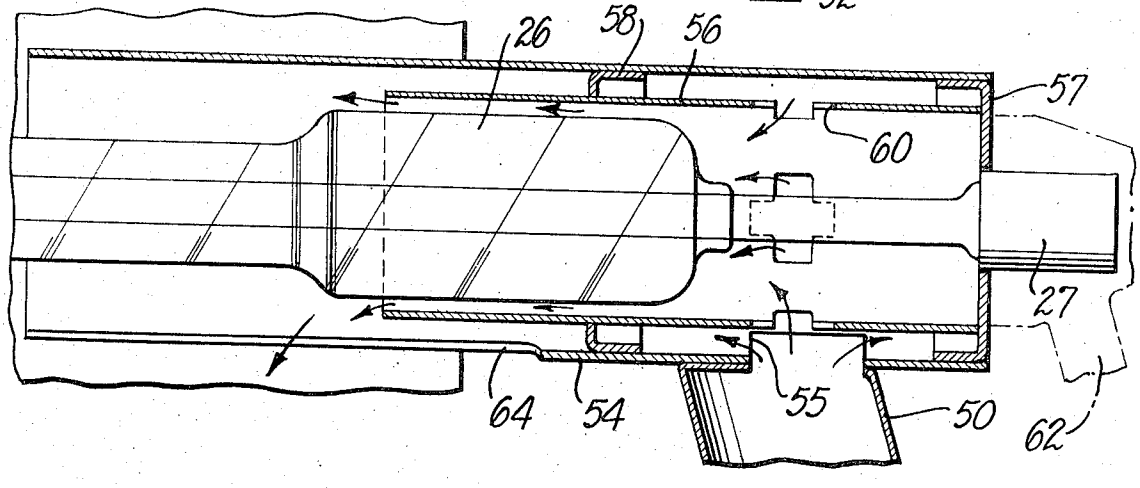


FIG. 4.



COOLING SYSTEM FOR XENON ARC LAMPS

This invention relates to high intensity light sources and in particular, to a new and improved cooling system for use with a lamp. Xenon arc lamps are now being used in place of the earlier carbon arc lights to provide a light source for motion picture projectors. The Xenon lamps provide a superior light output, but considerable problems have been encountered in the installations due to premature failure of the lamps.

A typical Xenon arc lamp comprises a generally tubular glass housing with an electrode projecting from each end and defining the arc space between the electrodes at the center of the housing. A glass-to-metal seal is provided at each end of the lamp between the housing and respective electrode, with the end of the electrode projecting from the seal to serve as a terminal for electrical connection.

It has been determined that the majority of the premature failures of the Xenon lamps results from excessive heating of the area around the seal. Attempts have been made to reduce the heating by directing a jet of air onto the seal area of the lamp, but this approach has not been satisfactory, particularly with regard to the seal positioned within the elliptical mirror. Although a part of the heat generated by the lamp is conducted through the electrode and the glass envelope to the seal, I have found that a very substantial amount of heat is reflected by radiation from the mirror to the seal area. By providing a bright reflecting shield around the seal area, in addition to a cooling air stream properly conducted within the shield, it is possible to greatly lower the seal temperature.

Accordingly it is the object of the invention to provide a new and improved cooling system particularly adapted for use with the end of a Xenon arc lamp positioned within the mirror of a motion picture projector lamp housing or the like. A further object is to provide such a cooling system incorporating a unique sleeve construction about the seal with an air supply for directing air in a predetermined path around this seal. An additional object is to provide such a cooling system including a highly reflecting sleeve about the seal protecting the seal from radiation from the reflecting mirror. Other objects, advantages, features and results will more fully appear in the course of the following description.

In the drawing:

FIG. **1** is an isometric view of a light source for a motion picture projector or the like, incorporating a presently preferred embodiment of the invention;

FIG. **2** is an enlarged sectional view of the lamp installation of the source of FIG. **1**;

FIG. **3** is an enlarged sectional view taken along the line **3—3** of FIG. **2**; and

FIG. **4** is a sectional view taken along the line **4—4** of FIG. **3**.

In FIG. **1**, the cooling system of the invention is incorporated in an otherwise conventional light source. An elliptical mirror **10** is supported on a mirror frame **11** within a cabinet **12**. A Xenon arc lamp **13** is positioned within the mirror **10**, as shown in detail in FIG. **2**, with the lamp output being directed by the mirror **10** through a lens **15**. A power supply for the lamp, appropriate controls, and a blower to supply cooling air may be incorporated in the cabinet **12**, with a duct **16** serving as an exhaust duct. The levers **17** are conventional

dowser handles for shutting off the light output, and plate **18** is a cover for the conventional lens cleaning access opening.

The lamp **13** may be a conventional Xenon arc lamp and is shown in greater detail in FIG. **2**, including a housing **21** and electrodes **22, 23**. The electrode **22** is joined to the housing **21** at a glass-to-metal seal **24**, with the electrode projecting from the housing to provide an electrical terminal at **25**. Similarly the electrode **23** is joined to the housing **21** in a glass-to-metal seal **26**, with the electrode projecting to provide another terminal **27**.

The lamp may be supported by the terminal pin **25** carried in a bracket **34** and secured by a nut **35**. The bracket **34** is fastened to a plate **33** carried by a support bracket **37**. An electrical connection may be made to terminal **25** by the conducting bracket **34** and the nut **35**. A power supply may be connected to the bracket **34** at a terminal **36**.

A sleeve **38** may be carried on the plate **33** about the lamp, and be held in place by springs **39** positioned between pins carried on the plate **33**.

A tube **31** is carried between the sleeve **38** and the mirror **10** and another tube **32** is carried on the tube **31** and the plate **33**. Cooling air is supplied to the left end of the sleeve **38** from a blower (not shown) for flow through the tube **31** about the seal **24** and also for flow through openings **40** in the sleeve **38** into the annular passage between the tubes **31, 32**. The tubes **31** and **32** are of sufficient diameter to eliminate direct radiation to the seal **24**.

The cooling system of the invention is installed about the seal **26** and is shown in greater detail in FIG. **4**. A duct **50** is supported at its lower end in a block **51** typically mounted in a bracket **52**. Air is supplied to the duct **50** from a blower (not shown) through a line **53** and the block **51**.

A sleeve **54** is carried at the upper end of the duct **50**, with an opening **55** in the side of the sleeve providing for air flow from the duct to the sleeve. Another sleeve **56** is carried within the sleeve **54** by means of an end plate **57** and an intermediate plate **58**. The duct, the sleeves and the plates may be fastened together to form a unitary structure, typically by welding. Openings **60** are provided in the sleeve **56**, with the openings **60** disposed around the sleeve.

The lamp **13** is positioned with the seal **26** within the sleeve **56** and with the terminal **27** projecting through the end plate **57** for connection to an electrical fitting **62**.

In the preferred embodiment illustrated in the drawing, the inner sleeve **56** projects over the glass-to-metal seal of the lamp, while the outer sleeve **54** projects beyond the inner sleeve toward the arc zone of the lamp. In operation, the electrical supply is connected to terminal **36** and fitting **62** to produce an arc between the electrodes in the lamp. The major portion of the radiation from the arc is directed to the right by the mirror **10**, but a portion of the radiation is directed toward the seal area of the lamp. The sleeves function to protect the seal from this radiant heating, and the performance of the sleeves is enhanced by providing a bright reflecting finish on the outer surface of the outer sleeve **54**. Air under pressure is directed through the duct **50** into the zone between the outer and inner sleeves **54, 56** and the plates **57, 58**. This zone serves as a manifold for feeding air through the opening **60** so that the cooling

air directly contacts all sides of the glass-to-metal seal, with the air exhausting along the annular passage between the lamp and the inner sleeve. The air then flows into the outer sleeve and exits generally radially through slot **64** in the outer sleeve **54.** The air flow paths are indicated by the arrows on FIG. **4.**

With the unique cooling system of the invention, the lamp seal is maintained at a temperature sufficiently low as to not adversely affect the glass-to-metal seal so that the operating life of a lamp is not reduced by seal failure.

I claim:

1. In a lamp cooling system, the combination of:

a cabinet;

a generally ellipsoidal mirror having an axis and mounted within said cabinet;

an elongate lamp having a lamp housing with first and second seals, said lamp having first and second in-line terminals entering the lamp housing at the first and second seals, respectively, with the lamp positioned within said mirror along said axis with said first seal and terminal in front of said mirror;

a sleeve positioned about said lamp at said first seal substantially concentric with said axis and defining an annular air flow passage between said seal and

sleeve, with said sleeve substantially closed at one end;

a radially positioned supply duct coupled to said sleeve between said first seal and one end;

means for supplying air under pressure to said supply duct for flow into said sleeve and through said annular passage about said first seal;

a second sleeve positioned about said one sleeve and extending along said lamp beyond said first seal and terminating short of the source of light within said lamp housing; and

baffle means engaging said sleeves defining a manifold therebetween;

said supply duct being connected to said second sleeve at said manifold, and said one sleeve having passage means for air flow from said manifold into said one sleeve.

2. A system as defined in claim **1** wherein said passage means comprises a plurality of openings spaced around said one sleeve.

3. A system as defined in claim **1** wherein said second sleeve includes an exhaust opening in the side thereof for air flow from said annular passage in a generally radial direction away from said lamp.

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