

Jan. 14, 1958

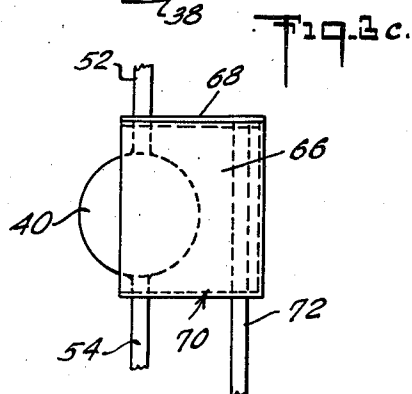
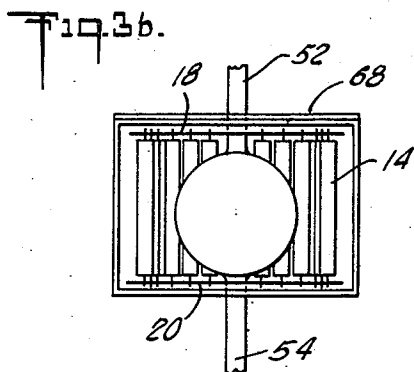
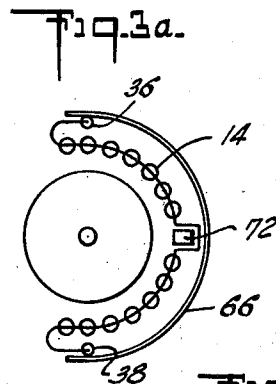
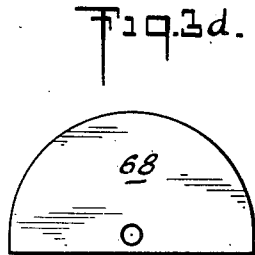
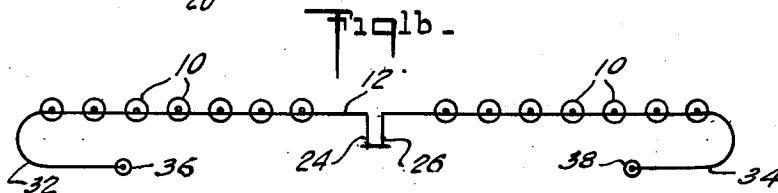
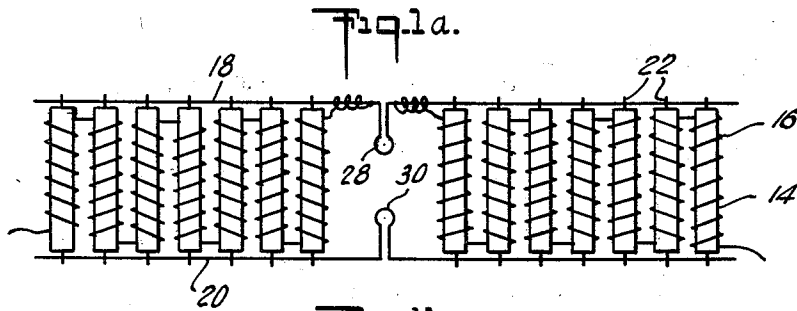
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2,820,164

ELECTRIC HEATER FOR DISCHARGE LAMPS

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3 Sheets-Sheet 1



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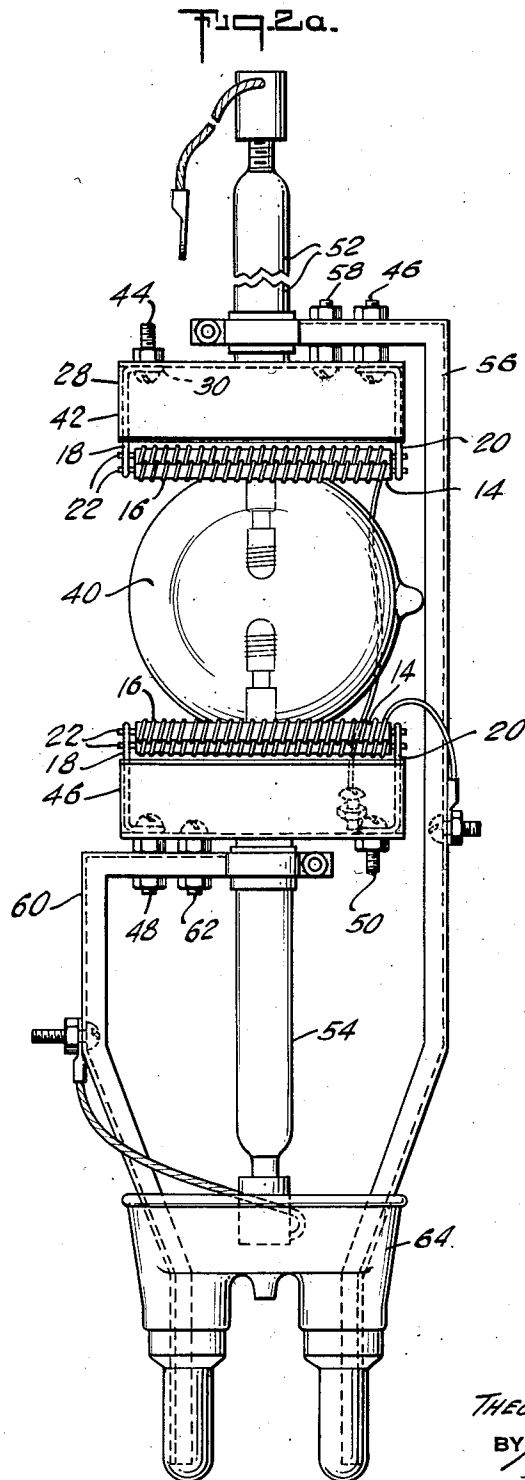
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ELECTRIC HEATER FOR DISCHARGE LAMPS

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3 Sheets-Sheet 2



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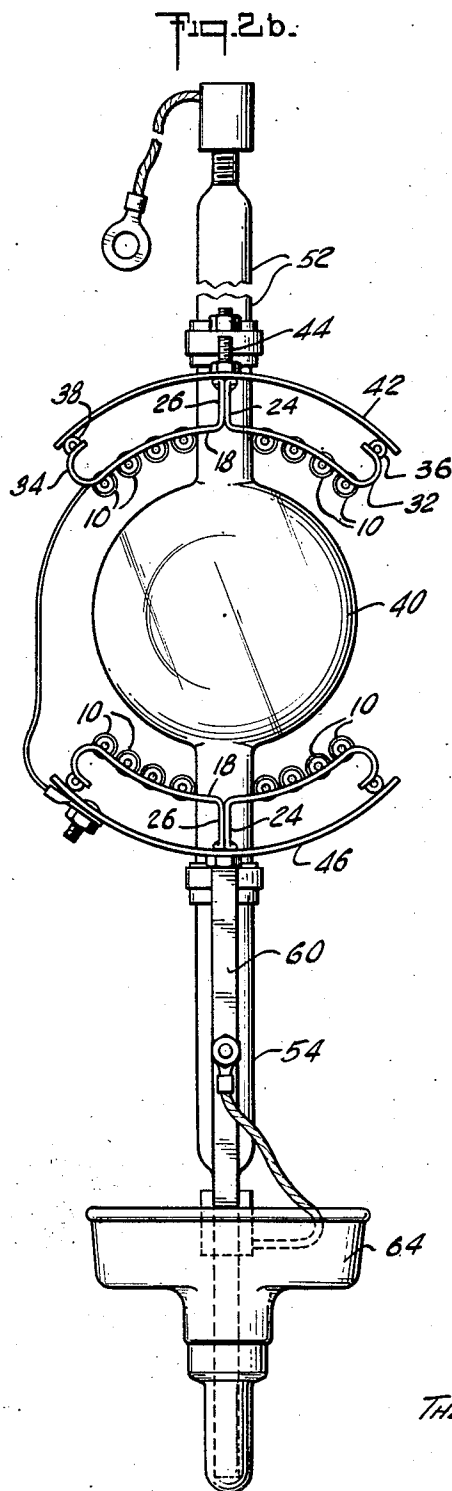
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ELECTRIC HEATER FOR DISCHARGE LAMPS

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3 Sheets-Sheet 3



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2,820,164

ELECTRIC HEATER FOR DISCHARGE LAMPS

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7 Claims. (Cl. 313—15)

This invention relates to electric heaters and, more particularly, electric heaters designed to initiate the operation of vapor discharge lamps.

In certain applications of vapor discharge lamps, such as quartz mercury vapor lamps, it is necessary to obtain immediate light output. The usual warm-up time needed to vaporize the mercury cannot be tolerated. In the past, immediate light output from mercury lamps has been accomplished by means of bulky electric heaters, which require complicated mechanism to remove the heaters when light is desired. The short arc high intensity mercury lamp when incorporated in a searchlight or a beacon requires immediate light in some applications. This invention contemplates a heater which can remain fastened to the lamp during lamp operation and yet not appreciably lower the efficiency by obscuring the light.

It is therefore an object of this invention to provide an electric heater adapted for use with vapor discharge lamps in applications which will not permit the usual warm-up time.

It is a further object of this invention to provide an electric heater which may remain fastened to the lamp during lamp operation and yet not appreciably lower the efficiency of the lamp by obscuring the light.

It is a still further object of this invention to provide an electric heater adapted for use with vapor discharge lamps which is simple to construct, easy to manufacture, and inexpensive to make, compared with conventional type electric heaters used for this purpose.

It is a still further object of this invention to provide an electric heater for use with a vapor discharge lamp which is incorporated in a searchlight.

It is a still further object of this invention to provide an electric heater for use with a vapor discharge lamp which is incorporated in an omnidirectional beacon.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

Figs. 1a and 1b are elevation and plan views, respectively, illustrating the basic structure of an electric heater embodying the principles of this invention,

Figs. 2a and 2b are front and side elevation views, respectively, of an omnidirectional beacon incorporating a first preferred embodiment of this invention, and

Figs. 3a, 3b, 3c and 3d are a plan view with a baffle removed, front and side elevation views, and a plan view of the baffle, respectively, of a searchlight incorporating a second preferred embodiment of this invention.

Referring now to Figs. 1a and 1b, which illustrate diagrammatically the basic structure of the electric heater contemplated by this invention, there is shown a plurality of like heating elements 10 mounted on a wire frame 12. Each heating element 10 consists of a cylindrical rod 14 having a given diameter and a given axial length and having an axial bore therethrough. The rod is composed of a refractory material, such as ceramic tubing. Wound

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around each rod is a coil 16 of resistance wire, such as Nichrome V. In order to obtain a snug fit between coil 16 and rod 14, coil 16 is originally wound on a mandrel with the inside diameter of the coil being made a few thousandths of an inch smaller than the outside diameter of rod 14, and is then fitted over rod 14.

Wire frame 12 consists of wires 18 and 20, which are positioned a fixed distance from each other over most of their lengths. Each of rods 14 of heating elements 10 has a wire 22 passing through its axial bore. Wire 22 is slightly longer than the axial length of rod 14. Heating elements 10 are arranged as shown in Fig. 1a with the axes of the rods 14 thereof disposed parallel to each other and perpendicular to wires 18 and 20. One end of wire 22 from each heating element 10 is fixedly attached to wire 18 and the other end of wire 22 from each heating element 10 is fixedly attached to wire 20. Wires 18, 20 and 22 are preferably made of a metal such as nickel.

To provide means for fastening wire frame 12 to a support such as a reflector, wires 18 and 20 each have a bent portion located intermediate the ends thereof. This bent portion consists of first and second sections 24 and 26 respectively oriented in a plane perpendicular to the axes of rods 14. The ends of sections 24 and 26 are interconnected by a folded third section 28 which runs parallel to the axes of rods 14. The end of folded section 28 is shaped in the form of ring 30.

The ends of wires 18 and 20 are bent into U-shaped sections 32 and 34 respectively as shown in Fig. 1b. Disposed between the tips of U-shape section 32 of wires 18 and 20 respectively is cylindrical spacer 36 which has an axial bore therethrough and is composed of a refractory material. Spacer 36 has a wire therethrough which has portions extending from both ends thereof which are fixedly attached to U-shaped section 32 of wires 18 and 20 respectively. In a like manner, spacer 38, which is similar to spacer 36, is connected to U-shaped section 34 of wires 18 and 20 respectively.

Coils 16 of each of heating elements 10 on either side of the intermediate bent portion are connected in series with each other, one end of the series connected coils being electrically connected to wire frame 12.

Referring now to Figs. 2a and 2b, there is shown a first preferred embodiment of this invention, which permits substantially 360° light coverage to be obtained from a lamp. The embodiment shown in Figs. 2a and 2b makes use of two electric heaters having the basic structure of Figs. 1a and 1b, wherein like reference numerals identify identical elements. As shown in Figs. 2a and 2b, the heaters partially surround globular mercury vapor discharge lamp 40, and lie on diametrically opposed sectors of a cylindrical surface which is concentric with lamp 40. Each sector has an arcuate extent substantially less than 180°. The top heater is connected to stainless steel reflector 42 by means of bolts 44 and 46 which pass through rings 30 of wires 18 and 20 respectively. In a similar manner reflector 46 is connected to the lower electric heater by means of bolts 48 and 50. Reflectors 42 and 44 respectively are coaxial and arcuately coextensive with the top and bottom electric heaters respectively.

Centrally located with respect to reflector 42 and passing therethrough is top electrode terminal 52 of lamp 40 and centrally located with respect to reflector 46 and passing therethrough is bottom electrode terminal 54 of lamp 40. Reflector 42 is connected to bracket 56 by means of bolts 46 and 58. Bracket 56, in turn, supports top electrode terminal 52, as shown in Figs. 2a and 2b. In a similar manner reflector 46 is connected to bracket 60 by means of bolts 48 and 62, and bracket 60 supports bottom electrode terminal 54. The remote ends of brackets 56 and 60 respectively are connected to plug 64, as shown.

Besides acting as a mechanical support brackets 56 and 60 are used to conduct the current to the electric heaters.

Referring now to Figs. 3a through 3d, there is shown a second preferred embodiment, wherein a searchlight incorporating the electric heater of this invention is illustrated. This second embodiment makes use of a single electric heater having the basic structure of Figs. 1a and 1b, wherein like reference numerals identify identical elements. The heater partially surrounds globular mercury vapor discharge lamp 40, and lies on a sector of a cylindrical surface which is concentric with lamp 40. This sector has an arcuate extent which is slightly greater than 180°. The heater is oriented with the axes of rods 14 thereof oriented substantially parallel to the line connecting terminal electrodes 52 and 54 of lamp 40. The heater is fastened to parabolic cylindrical stainless steel reflector 66 which is coaxial and arcuately coextensive with the electric heater.

Fastened to reflector 66 are top and bottom baffle plates 68 and 70 respectively. Baffle plates 68 and 70 lie in planes which are substantially perpendicular to the axes of rods 14 of the electric heater, and have holes therein which permit electrode terminals 52 and 54 respectively to pass therethrough. The entire assembly is supported by post 72 which also acts as one of the electrodes for applying current to the electric heater.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

I claim:

1. In combination with a globular discharge lamp having diametrically opposed electrode terminals extending therefrom; at least one electric heater adjacent said lamp, said heater comprising a reflector in fixed relationship relative to said lamp, said reflector having a reflecting surface defining a sector of a first cylinder which is concentric with and partially surrounds said lamp, a plurality of similar heating elements, each of said elements including a circular cylindrical rod of refractory material having a given diameter which is small relative to the diameter of said lamp and a given axial length, said rod having an axial bore therethrough, and a heating coil of resistance wire wound about said rod, a wire frame secured to said reflector mounting said plurality of elements, said frame including first and second wires which over most of their length have a substantially fixed spacing therebetween which is slightly greater than the axial length of said rods of said elements, and a like plurality of third wires each having a length which is greater than said given axial length, each of said third wires passing through the bore of a separate rod and extending from both ends thereof, said plurality of elements being disposed between said first and second wires with the axes of the rods thereof oriented substantially perpendicular to said first and second wires, the axes of adjacent rods being spaced from each other by a distance which is greater than said given diameter, the portion of said third wire extending from one end of each rod of said plurality of elements being fixedly connected to said first wire, and the portion of said third wire extending from the other end of each rod of said plurality of elements being fixedly connected to said second wire, said frame being disposed intermediate said reflector and said lamp at a fixed distance from said reflecting surface, whereby said frame defines a sector of a second cylinder which is concentric with said globular lamp.

2. The combination defined in claim 1, wherein each of said first and second wires includes a bent folded portion intermediate the ends thereof, said bent folded portion including first and second proximately positioned sections extending to the surface of said reflector and a third folded section extending a certain distance parallel to the axes of said rods and in contact with said reflector.

surface, said third section interconnecting said first and second sections, the end of said third section remote from said first and second sections being shaped in the form of a ring, wherein said reflector has first and second holes therethrough positioned in cooperative relationship with the ring of said third section of said first and second wires respectively, and wherein said frame is secured to said reflector by first and second bolts passing respectively through the ring of said third section of said first wire and said first hole and through the ring of said third section of said second wire and said second hole, and first and second nuts engaging said first and second bolts respectively.

3. The combination defined in claim 2, wherein each end of each of said first and second wires is bent into a U-shaped section which lies in a plane substantially perpendicular to the axes of said rods, each of said U-shaped sections being directed towards said reflector, and wherein said heater further includes first and second circular cylindrical spacers of refractory material each having an axial bore therethrough, said spacers being disposed with the axes thereof parallel to the axes of said rods, each of said spacers having a fourth wire passing through the bore thereof and extending from both ends thereof, the portion of said fourth wire extending from one end of each of said spacers being respectively fixedly connected to each of said U-shaped sections of said first wire approximately at the tip thereof, and the portion of said fourth wire extending from the other end of each of said spacers being respectively fixedly connected to each of said U-shaped sections of said second wire approximately at the tip thereof, said first and second spacers bearing against said reflector.

4. The combination defined in claim 3, wherein said heater is disposed with the axes of the rods of the elements thereof parallel to the line connecting the electrode terminals of said lamp, the length of said reflector is greater than the diameter of said lamp, and the arcuate extent of the sector of said first cylinder is at least 180°, and wherein said heater further includes first and second baffle plates oriented substantially perpendicular to the axes of said rods and secured respectively to the opposite ends of said reflector, each of said baffle plates having a hole therein through which a respective electrode terminal of said lamp passes.

5. The combination defined in claim 4, wherein all the coils of resistance wire of said plurality of heating elements are connected together in series and one end of the resistance wire of said serially-connected coils is electrically connected to said wire frame.

6. The combination defined in claim 3, wherein said combination includes another heater opposite to and similar to said one electric heater, the reflector of each of said heaters having a centrally located hole therein through which a separate one of said electrode terminals passes, means for fastening each of said heaters to a separate one of said electrode terminals, said heaters being disposed with the axes of the rods of the elements thereof substantially perpendicular to the line connecting said electrode terminals, and the arcuate extent of the sectors of the first and second cylinders defined by each of said heaters being substantially less than 180°.

7. The combination defined in claim 6, wherein all the coils of resistance wire of said plurality of heating elements of each respective heater are connected together in series and one end of the resistance wire of said serially-connected coils is electrically connected to said wire frame of that respective heater.

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