

July 22, 1958

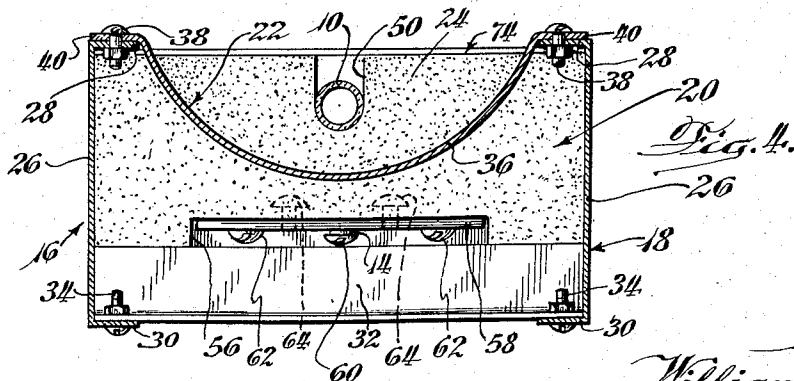
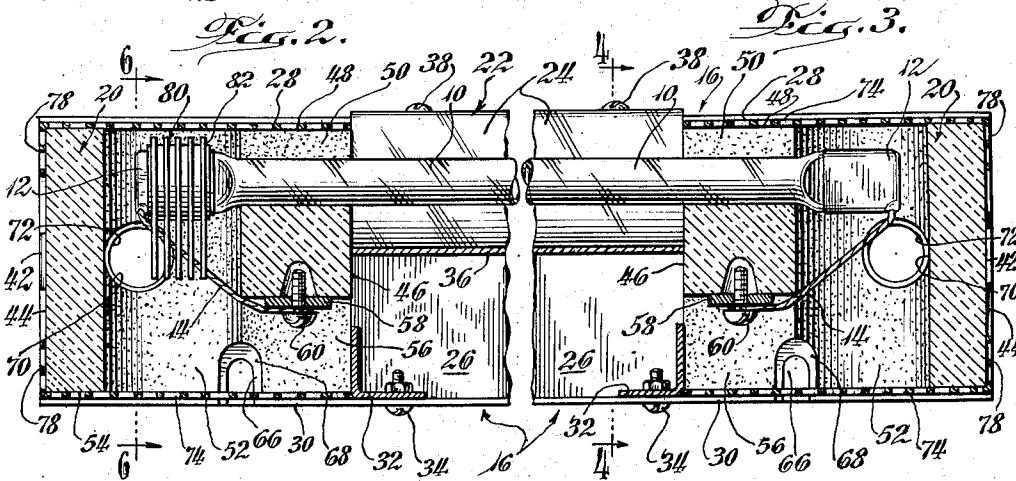
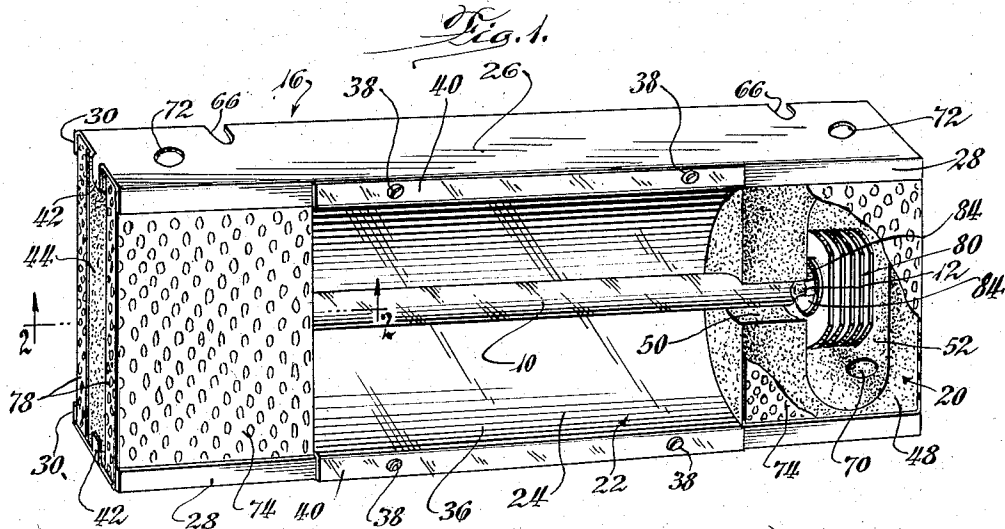
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2,844,699

HIGH HEAT INFRARED LAMP HOLDER

Filed June 8, 1955

2 Sheets-Sheet 1



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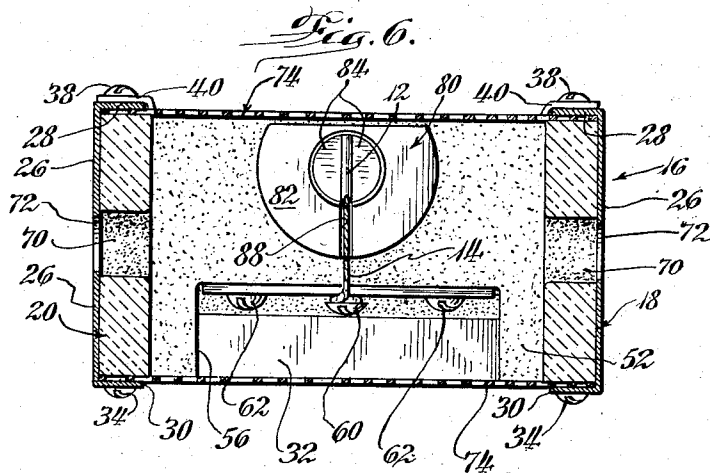
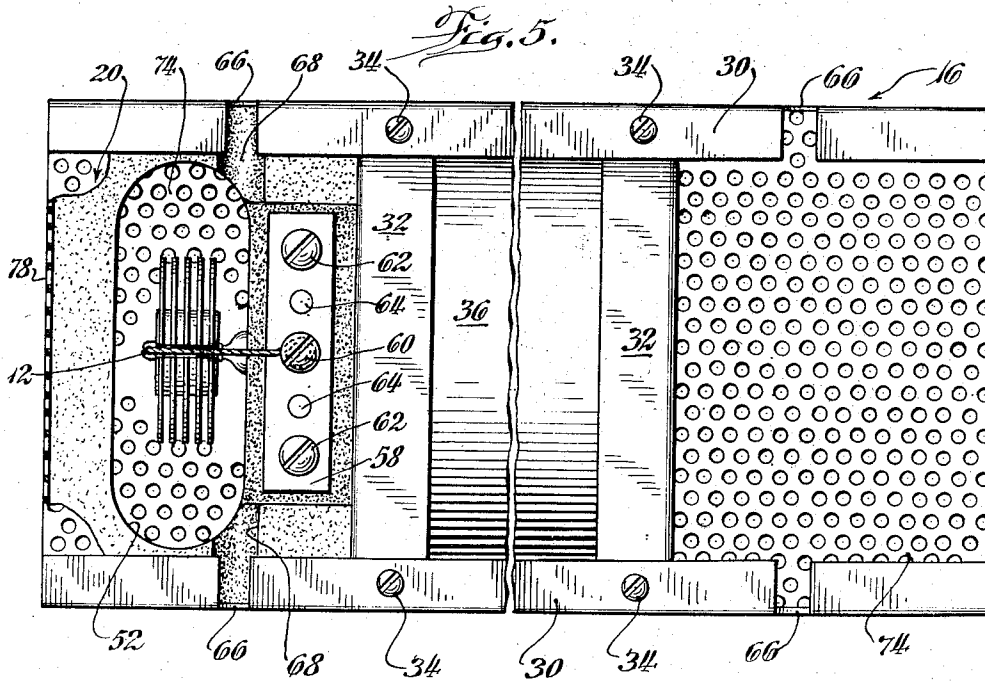
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HIGH HEAT INFRARED LAMP HOLDER

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7 Claims. (Cl. 219—34)

The present invention relates to infrared heating equipment and particularly to a novel lamp holder for supporting and electrically connecting a tubular infrared lamp.

Recently there has been developed a quartz tube infrared lamp which has a substantially higher heat output than the heretofore commonly used bulb type lamps and has an appreciably long life, stated to be up to five thousand hours. In view of the extremely high heat output of these lamps, which are now available in 500, 1000 and 2500 watt sizes, certain problems have arisen in connection with their mounting and incorporation into heating ovens and other installations. The present invention is directed toward a novel mounting for such tubular lamps.

It is, therefore, a principal object of the present invention to provide a novel, physical and electrical mounting for a quartz tube infrared lamp having an extremely high heat output which mounting may readily be incorporated into industrial and residential heaters, ovens and other installations.

Another object is to provide a novel mounting for such infrared tubular lamp incorporating means for free circulation of air to dissipate heat from the equipment.

Another object is to provide a new and improved lamp holder for tubular lamps incorporating novel thermal and electrical insulation elements.

Other objects and advantages will become apparent from the following description taken in conjunction with the accompanying drawings showing a typical lamp holder of the present invention wherein:

Fig. 1 is a perspective view of a lamp holder for a single tubular lamp;

Fig. 2 is a fragmentary cross-sectional view through one end of the lamp holder illustrating details of construction and the mounting of the tubular lamp;

Fig. 3 is a fragmentary view similar to Fig. 2 but taken at the other end of the lamp holder and illustrating a modified arrangement;

Fig. 4 is a cross-sectional view and may be considered as taken along the line 4—4 of Fig. 3 looking in the direction of the arrows;

Fig. 5 is a bottom plan view with parts broken away illustrating the lamp holder of the present invention; and

Fig. 6 is a cross-sectional view taken substantially along the line 6—6 of Fig. 2 looking in the direction of the arrows.

The lamp mounted in the holder of the present invention and which forms no part of the invention is indicated in the drawing by the reference character 10 and is a tubular quartz infrared lamp having an outside diameter of approximately three-eighths of an inch and a length dictated by its wattage. At its ends the tube is flattened and metal terminal pieces 12 are secured over the flattened ends in electrical contact with the lamp's tungsten filament. The terminals 12 are fitted with lead wires 14 for electrically connecting the lamp into the power circuit.

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This type of quartz tube, infrared lamp is currently manufactured by the General Electric Company.

The lamp holder, indicated in its entirety by the reference character 16, includes a housing 18, a pair of electrical and thermal insulating supporting elements or blocks 20 and a generally concave reflector 22. The infrared lamp 10 is supported in the blocks 20 and is shielded at one side by the reflector 22, the opposite side of the housing being open at 24 to expose the lamp and to direct its radiation (Figs. 1 and 4). The housing 18 comprises a pair of longitudinally extending side walls 26 having in-turned flanges 28 and 30 at their front and rear edges, respectively. The side walls are interconnected by a pair of angle members 32 which are secured as by bolts and nuts 34, sheet metal screws, spotwelding or the like, to the rear flanges 30 of the side walls. The transverse angle members 32 interconnecting the side walls define the spaces occupied by the supporting blocks 20 and by the reflector 22.

The reflector 22 comprises a sheet of aluminum or polished stainless steel 36 of concave shape secured to the front flanges 28 of the side walls by bolts 38 passing through flanges 40 which overlie the flanges 28. The reflector sheet 36 may be secured to the flanges 28 in any other suitable manner as by spotwelding, sheet metal screws, and the like.

The lamp supporting blocks 20 are held in place at the opposite ends of the housing by tabs 42 which are bent over from the planes of the side walls 26 across the outer face 44 of the blocks so that the latter are retained between the tabs 42 and the angle elements 32 and the reflector plate 36.

The supporting blocks 20 are each formed of a porous insulating firebrick or ceramic which provides both thermal and electrical insulation for the quartz tube infrared lamp. Each block has the outer face 44 against which the retaining tabs 42 are pressed, and an inner face 46 which abuts against the angle members 32 and an edge of the sheet metal reflector plate 36. Each block is provided at its front face 48 with a central U-shaped slot 50 communicating the inner face 46 with a generally oval-shaped cavity 52 extending, as seen in Figs. 2 and 3, through the block 20 from the front face 48 to the rear face 54. The U-shaped slot 50 is dimensioned to receive and support an end of the infrared tube 10 adjacent the terminal 12 thereof. Since the block 20 is formed of a material having high thermal insulating characteristics, the high temperature of the tube has no adverse effect thereon. By reading Figs. 2 and 3 together it will be seen that the tube is properly supported in the lamp holder 16 at the opposite ends of the housing 18 and that the terminals 12 thereof are situated in the terminal cavities 52.

Each block is formed at its rear face with a wide U-shaped recess 56, which is best seen in Fig. 6, and to the inner side of which is secured a bus bar 58 having a central terminal 60 and end terminals 62. The bus bar is secured to the block 20 by inverted bolts 64 the heads of which are cemented into recesses formed in the material of the block as shown in dotted lines in Fig. 4. The lead wire 14 from the lamp terminal 12 is drawn tightly from the terminal to the central terminal 60 on the bus bar and secured there. If the lead wire is unnecessarily long to extend from the terminal 12 to the binding post 60 the excess length should be cut off to prevent shorting. This connection is made at both ends of the lamp 10 and at the opposite ends of the holder 16 and in this manner the infrared lamp 10 is both physically mounted in and electrically connected to the holder 16.

The power supply is connected to the lamp by means of leads (not shown) which enter the rear of the block

20 from either side through an aperture 66 in the side walls 26 of the housing 18 and coincident apertures 68 in the block 20. These lead wires are connected to one or perhaps both of the terminals 62. The side terminals 62 permit the construction of heating ovens and the like of a plurality of holder units 16 with the lamps 10 connected in series, series-parallel, or parallel as may be desired.

While the specific holder 16 shown in the drawings and described in the foregoing portion of this specification is designed to hold a single tubular lamp 10, it is obvious that the same holder can be modified by making the support blocks 20 wider and providing a plurality of lamp slots 50 and longer bus bars 58 with a plurality of terminals 60 to correspond with the number of lamps to be mounted. It has been found feasible to accommodate as many as six of these improved infrared lamps in a single holder. Furthermore, the same holder structure may be used for any length of tube, it being necessary merely to provide side walls 18 and reflector plates 36 of proper lengths.

Cooling of the lamp terminals is one of the important features of the lamp holder of this invention and the terminal cavities 52 play an important part in this function. It will be observed from the drawings that these terminal cavities extend between the faces 48 and 54 of each block 20. At opposite sides of the block additional openings 70 are provided which coincide with similar openings 72 in the housing side walls 26. When a number of these lamp holders are stacked one on top of the other in the position shown in Fig. 1, these openings 70, 72 coincide to form a stack through which circulation of air may be obtained.

The cavities 52 are partially closed at the front and rear of the holder by L-shaped perforated plates 74 the longer length 76 of which slides between the block face and the overlapping flanges 28 or 30 as the case might be. Each of the perforated closure plates 74 is provided with a short length 78 which bears against the outer face 44 of the block 20 to locate it properly relative to the holder. Four of these perforated plates 74 are required for each holder and they are readily removed by sliding them outwardly to permit access to the lamp for its removal which is accomplished by sliding it forwardly through the slots 50 after having first loosened the lead wires 14 from the center terminals 60 of the bus bars 58.

Additional aid in cooling the terminals may be provided by radiators 80 which are arranged to encompass the terminals 12. Each radiator 80 is fitted with a plurality of radiating fins 82 in thermal contact with the terminal 12 by means of semi-cylindrical inserts 84 or by packing the space between the fins and the terminal with a good thermal conductor such as fine steel wool. In order to accommodate space for the lead wire 14 the fins are slotted at 88 as best seen in Fig. 6. It is immaterial that the lead wire may have electrical contact with the fins as the latter are in electrical contact with the terminal 12. Care must be taken, however, to shape the fins in such fashion that they will not touch the cover plates 74, and are spaced therefrom as shown in Figs. 2 and 6. Use of these radiating fins has been effective to reduce the thermal temperature of the tubular lamp from about 600° C. to 300° C. which under certain circumstances is desirable.

While two embodiments of the tubular lamp holder constituting this invention have been shown and described, it will be apparent that modifications and variations thereof may be made without departing from the underlying principles of the invention. It is, therefore, desired by the following claims to include within the scope of the invention all such variations and modifications by which substantially the results of this invention may be obtained through the use of substantially the same or equivalent means.

What is claimed as new and desired to be secured by United States Letters Patent is:

1. A holder for a high heat tubular infrared element of the quartz tube type having end terminals fitted with lead wires, comprising, in combination, a pair of spaced electrical and thermal insulating block members each having an opening therein to receive a terminal end of a quartz tube with the major portion of the latter bridging between said block members, a heat radiating member mounted on each terminal of the tube in thermal contact therewith, a terminal strip fixed to each block member and to which a lead wire of the tube is secured to fasten the tube to said block member, and a housing enclosing said block members in spaced relationship and having an open side to expose the tube, said housing having a plurality of small openings adjacent said heat radiating members through which heat may be dissipated.

2. A holder for a high heat tubular infrared element having end terminals fitted with lead wires, comprising in combination, a pair of spaced electrical and thermal insulating block members, each block member having a cavity therein extending between opposite faces thereof to receive a terminal end of a tubular infrared element, an opening in each member through which the tubular element may project to locate an end terminal thereof in said terminal cavity with the major portion of the tubular element bridging between said block members, a heat radiating member adapted to be mounted on each terminal of the tubular element in thermal contact therewith, a terminal strip mounted on each block member adjacent said terminal cavity and to which a lead wire of the tubular element is adapted to be secured to fasten the tubular element to said block member, and a housing enclosing said block members in spaced relationship and having an open side to expose the major portion of the tubular element, said housing having openings coinciding with said terminal cavities through which heat may be dissipated from the terminal ends of the tubular element.

3. A holder for a high heat tubular infrared element having end terminals fitted with lead wires, comprising in combination, a pair of spaced electrical and thermal insulating block members, each block member having a cavity therein extending between opposite faces thereof to receive a terminal end of a tubular infrared element, an opening in each block member through which the tubular element may project to locate an end terminal thereof in said terminal cavity with the major portion of the tubular element bridging between said block members, a plurality of heat radiating fins adapted to be mounted on each terminal of the tubular element in thermal conductivity therewith, a terminal strip mounted on each block member adjacent said terminal cavity and to which a lead wire of the tubular element is adapted to be secured to fasten the tubular element to said block member, and a housing enclosing said block members in spaced relationship and having an open side to expose the major portion of the tubular element, said housing including a reflector opposite said open side and extending between said block members and including perforated covers closing the opposite ends of said terminal cavities through which heat may be dissipated from said heat radiating fins.

4. A holder for a high heat tubular infrared element of the quartz tube type having end terminals, comprising in combination, a pair of spaced electrical and thermal insulating block members, each member having an opening therethrough to receive a terminal end of a quartz tube with the major portion of the latter bridging between said block members and each member having a tube opening therein normal to the axis of said first named opening and through which the tube projects into said first named opening, a terminal strip mounted on each block member adjacent said opening, means removably securing the end terminals of the quartz tube to said strips, and a housing enclosing said block members

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in spaced relationship and having an open side to expose the quartz tube.

5. A holder for a high heat tubular infrared element having end terminals, comprising in combination, a pair of similar spaced electrical and thermal insulating block members formed of porous firebrick, said block members each having an opening therethrough extending between opposite faces thereof to receive a terminal end of a tubular infrared element, a slot in one face of each member normal to the axis of said opening and through which the tubular element may extend to project an end terminal thereof in said terminal opening with the major portion of the tubular element bridging between said block members, a terminal strip mounted on each block member adjacent said terminal opening, means removably securing the end terminals of the infrared element to said strips, and a housing enclosing and mounting said block members in spaced relationship and having an open side to expose the tubular element, said housing including a removable panel over said one face of each block member to facilitate access to the tubular element for removal of the latter.

6. A holder for a high heat tubular infrared element of the quartz tube type having end terminals fitted with lead wires, comprising in combination, a pair of spaced electrical and thermal insulating blocks, each block having a terminal opening extending between opposite faces thereof to receive a terminal end of a quartz tube and to provide for the circulation of air thereover, a slot in one face of each block communicating with said opening and through which the tube is adapted to extend to project a tube terminal in said terminal opening, a terminal strip mounted on each block member adjacent said terminal opening and to which a lead wire of the

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tube is adapted to be secured to fasten the tube to said block, and a housing enclosing said blocks in spaced relationship and having an open side at said slotted block face to expose the tube.

7. A holder for a high heat tubular infrared element of the quartz tube type having end terminals fitted with lead wires, comprising in combination, a pair of spaced electrical and thermal insulating blocks, each block having a terminal opening extending between opposite faces thereof to receive a terminal end of a quartz tube and to provide for the circulation of air thereover, a slot in one face of each block communicating with and normal to the axis of said opening and through which the tube is adapted to extend to project a tube terminal in said terminal opening, a terminal strip mounted on each block adjacent said terminal opening and to which a lead wire of the tube is adapted to be secured to fasten the tube to said block, and a housing enclosing and mounting said blocks in spaced relationship and having an open side at said slotted block face to expose the tube, said housing including removable members having air holes therethrough over said blocks at the opposite ends of said terminal openings.

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