May 13, 1958 S. J. TEMPLE 2,834,861

RADIANT HEATER

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Fig. 1

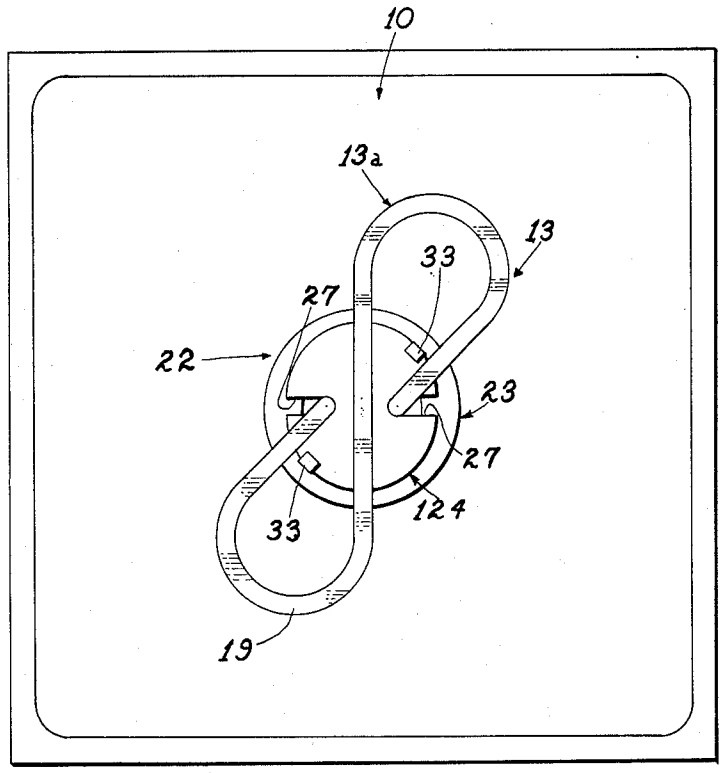
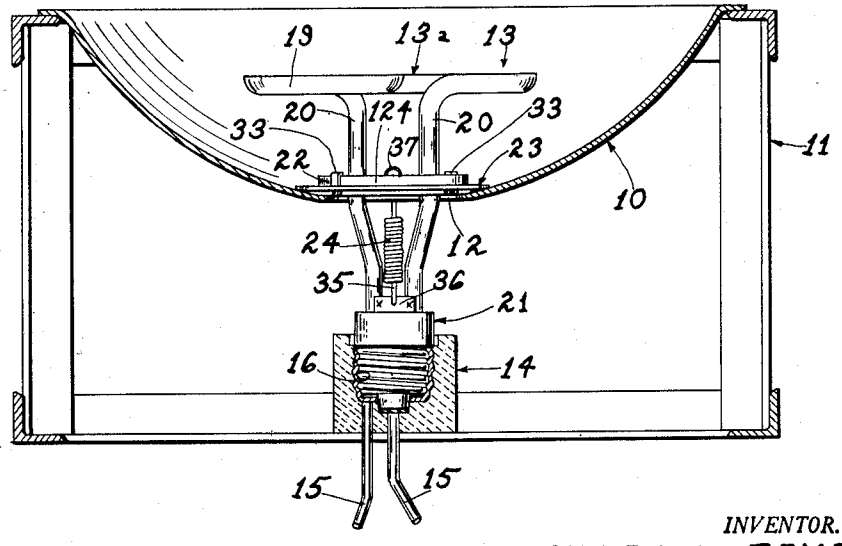


Fig. 2



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Fig. 4

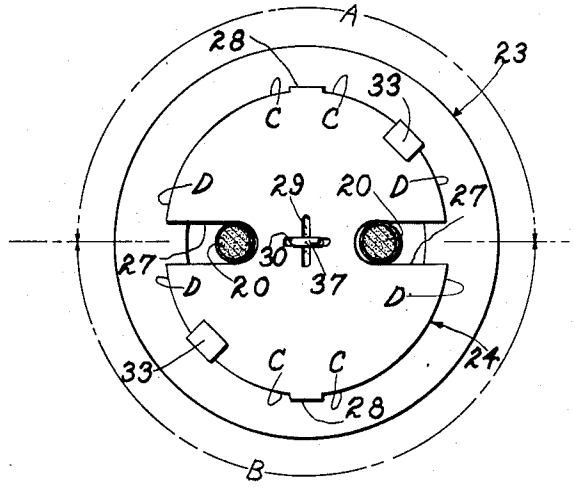
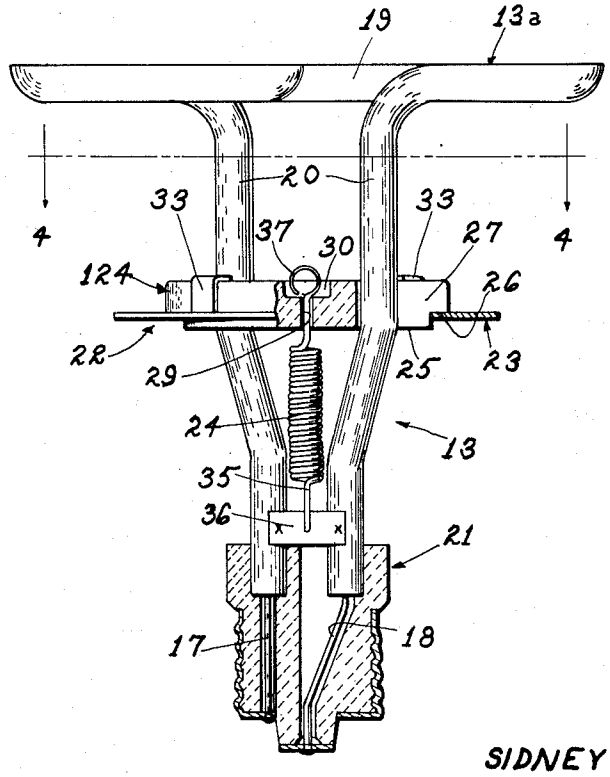


Fig. 3



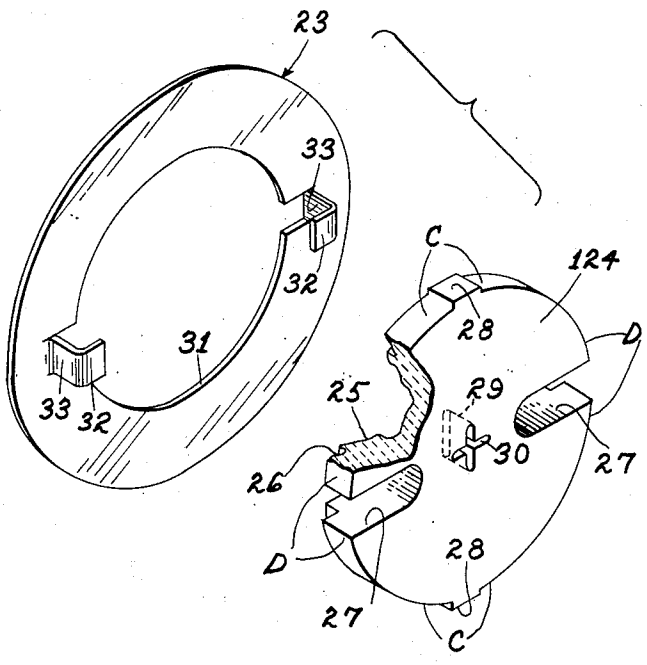
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Fig. 5



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RADIANT HEATER

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Application July 22, 1955, Serial No. 523,865

9 Claims. (Cl. 219—34)

The present invention relates to electric heaters, more particularly to electric heaters of the type adapted for employment with reflectors which direct and/or confine the heat radiated by the heaters, and the principal object of the invention is to provide new and improved electric heaters of the character described.

In the past, special infrared generating glass lamps have been used by industry to dry finishes, remove moisture, and for many other purposes. Each lamp normally has its own reflector which properly directs the heat for maximum efficiency and the lamps are usually used in multiples to achieve the required heat output and coverage.

These lamps, while suitable for certain purposes, have not been entirely satisfactory since they are prone to break when subjected to rapid temperature changes or to rough handling. Moreover, their life expectancy has been relatively short.

In view of the shortcomings of infrared generating glass lamps, it has been proposed that heaters of the type using a resistor embedded in compacted refractory material and encased in a metallic sheath be substituted for the glass lamps. On the surface, this proposal seems to be an obvious solution to the problem since the sheathed embedded type heater has long life, is nearly indestructable, may be made in a great range of sizes, wattages and voltages, is relatively cheap to make, and many other reasons. However, several obstacles have stood in the way of using metallic sheathed heaters with conventional reflectors.

Since the aperture in the reflector through which the neck of the lamp ordinarily passes is relatively large, considerable heat is lost through this aperture when a metallic sheathed heater is employed because of the fact that the aperture is so much larger than the legs of the heater which extend therethrough. Moreover, since a metallic sheathed heater radiates heat in all directions, considerable heat passes through the aperture to the terminal end of the heater where the electrical connections are made. As will be appreciated, this heat tends to deteriorate the terminal connections and the electrical wiring.

The present invention provides metallic sheathed heaters which possess none of the hereinabove mentioned disadvantages possessed by prior art heaters of this type. Other advantages will become apparent from a study of the following description and from the drawings appended hereto.

In the drawings accompanying this specification and forming a part of this application there is shown, for purpose of illustration, an embodiment which the invention may assume, and in these drawings:

Figure 1 is a plan view of a preferred embodiment of the present invention showing its use with a suitable reflector assembly,

Figure 2 is a side elevational view, partially in section, of the assembly illustrated in Figure 1,

Figure 3 is an enlarged elevational view of the heater which comprises the present invention, certain parts being broken away to better illustrate construction,

Figure 4 is a transverse sectional view generally corresponding to the line 4—4 of Figure 3, and

Figure 5 is an exploded perspective view of certain details.

Referring to Figures 1 and 2, there is shown a conventional reflector assembly which comprises a reflector pan **10** secured by any suitable means to a supporting frame **11**. The center of the reflector is apertured at **12** to pass the heater **13** and the frame **11** supports means in alignment with aperture **12** for in turn supporting the heater and providing for making the necessary electrical connections thereto. At the present time, such means comprises a dielectric member **14** which supports the heater and to which power leads **15, 15** are connected. Since the heater herein disclosed is of the screw base type, member **14** provides a suitable socket **16** for threadably receiving the base of the heater.

As seen in Figures 1, 2 and 3, the herein disclosed heater comprises a shaped heating element **13***a* formed of the usual elongated metallic sheath filled with compacted refractory material in which is embedded the usual resistor conductor. Extending from opposite ends of the heater sheath (see Figure 3) are respective terminal pins **17, 18** which are electrically connected in usual manner to opposite ends of the resistor conductor internally of the sheath. The terminal pins, since they offer little resistance to current flow, do not themselves generate heat; however, the resistor conductor to which the inner ends of the terminal pins are connected does resist flow of current and, therefore, the resistor conductor and the adjacent portions of the sheath reach elevated temperatures when current of the proper voltage is passed therethrough. Accordingly, the intermediate portion of the elongated heating element **13***a*, or that portion intermediate the inner ends of the terminal pins and between which the resistor conductor extends, is known as the heat generating portion. It is believed that a more detailed description of metallic sheathed electric heaters is unnecessary since such heaters are well-known in the art.

In the present application, the heat generating portion **19** of the elongated heating element **13***a* is formed to a generally **S** configuration to provide a substantially flat heating pattern while the terminal ends **20** of the element extend laterally of the heat generating portion and in side-by-side relation. As best seen in Figure 3, a suitable screw plug **21** is secured to the extremity of terminal ends **20** and the terminal pins **17, 18** are brazed or otherwise suitably electrically connected to the respective spaced portions of the plug. It is to be understood that when plug **21** is screwed into socket **16** provided by member **14**, electrical connection will be established between terminal pins **17, 18** and respective power leads **15, 15.**

In order to close aperture **12** in the reflector **10** and reduce the loss of heat therethrough with the attendant possibility of damaging parts which lie behind the reflector, heater **13** carries shield means **22** adapted to overlie the opening. As herein disclosed, shield means **22** comprises a metal disk **23** slideably carried by element portions **20** and resiliently biased by means of a spring **24** in a direction away from the heat generating portion and toward engagement with the reflector **10.**

For the purpose of electrically isolating the metallic sheath of the heater from the reflector to reduce shock hazard and to insure electrical isolation of the sheaths of respective heaters when they are employed in banks (isolation for the latter reason being necessary with certain electrical hook-ups to reduce the danger of burning out the heaters), disk **23** is not carried directly by

the portions 20 but is secured to a suitable heat-resistant, dielectric body 124.

As best seen in Figures 3, 4 and 5, body 124 is a generally round flat body having on one side a reduced diameter portion 25 and a radially extending shoulder 26. Extending toward the center of the body from its periphery and in diametrically opposed relation are a pair of slots 27 proportioned to slideably fit with the spaced adjoining terminal ends 20 of the heater.

With reference to Figure 4, it will be noted that the periphery of body 124 is not circular but is divided into two segments A and B whose respective centers are spaced from the center of the body. Accordingly, peripheral portions C of each segment are spaced further from the center of the body than are portions D for a purpose to be disclosed. Moreover, the periphery of the body 124 is provided with diametrically opposed, radially extending lugs 28 adjacent peripheral portions C of segments A and B.

As most clearly shown in Figure 5, a narrow slot 29 extends through body 124 at its center and the face of the body opposite reduced diameter portion 25 is formed with another slot 30 which bisects slot 29 at right angles but which does not extend through the body.

As previously mentioned, the shield means comprises a metal disk 23 adapted to be carried by dielectric body 124. Disk 23 has a central aperture 31 of a size to slideably fit over reduced diameter portion 25 of the body. Diametrically opposed tabs 32 are struck from disk 23 and each is formed, as shown, for engagement with body 124, in a manner to appear.

In assembling body 124 with the heater and referring particularly to Figure 3, the body will be turned on edge and inserted between the spaced terminal portions 20 of the heater. The body will then be turned horizontally, slots 27 thereof being aligned with respective terminal end portions to permit entry of such end portions into respective slots. Note that reduced diameter portion 25 of body 124 will be positioned away from heat generating portion 19 of the heater.

Disk 23 will then be slipped over the lower end of the heater and seated against shoulder 26 of the body, tabs 32 of the disk being aligned with respective slots 27 of the body so as to pass therethrough. The disk will then be rotated in one direction or the other until the periphery of body 124 wedges against upstanding adjacent portions 33 of tabs 32 to lock the disk and the body together.

It is to be understood that the spacing between portions 33 of tabs 32 is slightly greater than the distance across peripheral portions D of the body. However, this spacing is less than the distance across peripheral portions C of the body; accordingly, rotation of the disk relative to the body will wedge the two together. Previously mentioned lugs 28 of the body 124 are provided to prevent inadvertent rotation of disk 23 beyond the point where the maximum wedging action occurs.

The means presently provided for resiliently urging body 124, and disk 23 carried thereby, in a direction away from heat generating portion 19 of the heater comprises previously mentioned spring 24 (see Figure 3) whose lower end 35 is anchored to a clip 36 welded or otherwise secured across the terminal end portions 20 of the heater. The upper end of spring 24 is formed to provide an eye 37 which is adapted to pass through slot 29 in member 124. The upper end of spring 24 is engaged with body 124 by passing eye 37 through slot 29 and then rotating the eye ninety degrees and allowing it to seat in slot 30. Tension of the spring will prevent its unintentional disassembly from body 124 as will readily be seen.

In assembling the present heater with a reflector assembly of the general type herein disclosed, it is only necessary to screw plug 21 of the heater into socket 16 of member 14 carried by the reflector frame. Clearly, this rigidly supports the heater in position and completes electrical circuit connections thereto. Disk 23 of shield means 22 will seat against the reflector 10 in overlying relation with aperture 12, spring 24 resiliently holding the shield means in place to block flow of heat through the aperture in the reflector.

Under certain circumstances, shield means 22 also performs another function—that of restricting flow of air from the terminal portion of the heater through the aperture in the reflector toward the heat generating portion. At times, it is desirable to direct flow of air behind the reflector to keep the terminal portion of the heater cool. Naturally, it is desirable to prevent passage of this air through the aperture in the reflector.

While the invention herein disclosed illustrates an electric heater of the screw base type, it is to be understood that this construction is illustrative only and that any other suitable construction could be employed for supporting the heater in position adjacent the reflector and for making the necessary electrical connections thereto.

In view of the foregoing it will be apparent to those skilled in the art that I have accomplished at least the principal object of my invention and it will also be apparent to those skilled in the art that the embodiment herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described, hence it will be appreciated that the herein disclosed embodiment is illustrative only, and that my invention is not limited thereto.

I claim:

1. An electric heater for use with an apertured supporting member, comprising an electric heating element having electrically connected spaced-apart portions one of which generates heat when current is passed therethrough and the other of which provides for making an electrical connection to a source of current, said heating element being securable to said supporting member and passing through its aperture to position said one portion thereof on one side of said member and said other portion thereof on the other side of said member, shield means slideably carried by said heating element and interposed between said one portion and said supporting member and overlying the aperture in the latter to protect said other portion from the heat produced by said one portion, and means resiliently urging said shield means in a direction away from said one portion and toward said supporting member.

2. An electric heater for use with an apertured supporting member, comprising an elongated sheathed heating element having an intermediate portion which generates heat when current is passed therethrough and having integral terminal portions which carry current to said intermediate portion, each terminal portion having an end spaced from said intermediate portion which provides for making an electrical connection to a source of current, said heating element being formed to position its terminal portions in adjoining relation and said element being securable to said supporting member with said terminal portions passing through the latter's aperture to position said intermediate portion on one side of said member and to position the electrical connection provided by said terminal portions on the other side of said member, a shield slideably carried by said element and interposed between said intermediate portion and said supporting member and overlying the aperture in the latter to protect the electrical connection provided by said terminal portions from the heat produced by said intermediate portion, and means resiliently urging said shield in a direction away from said intermediate portion and to engagement with said supporting member to restrict circulation of air through the aperture in said member.

3. An electric heater for use with an apertured supporting member, comprising an elongated sheathed heat-

ing element having an intermediate portion which generates heat when current is passed therethrough and having terminal portions which carry current to said intermediate portion, each terminal portion having an end spaced from said intermediate portion which provides for making an electrical connection to a source of current, said heating element being formed to position its terminal portions in adjoining relation and said element being securable to said supporting member with said terminal portions passing through the latter's aperture to position said intermediate portion on one side of said member and to position the electrical connection provided by said terminal portions on the other side of said member, a metallic shield slideably carried by said element and interposed between said intermediate portion and said supporting member and overlying the aperture in the latter to protect the electrical connection provided by said terminal portions from the heat produced by said intermediate portion, means resiliently urging said shield to engagement with said supporting member to restrict circulation of air through the aperture in said member, and dielectric means interposed between said shield and said heating element to insure electrical isolation therebetween.

4. An electric heater, comprising an elongated sheathed heating element having an intermediate heat generating portion and having integral terminal portions which carry current to said heat generating portion, said heating element being formed to position said terminal portions in spaced, generally parallel relation and each terminal portion having an end which provides for making an electrical connection to a source of current, a dielectric body having one end reduced in size to provide a radially extending shoulder, said body having opposed slots for receiving respective terminal portions and being slideable therealong toward and away from said heat generating portion, and a metallic shield protecting said terminal portion ends from the heat produced by said generating portion, said shield having an aperture of a size to fit over the reduced size portion of said body and said shield being carried by the latter in abutting relation with said shoulder and in electrical isolation with said heating element.

5. An electric heater for use with an apertured supporting member, comprising an elongated sheathed heating element having an intermediate heat generating portion and having integral terminal portions which carry current to said heat generating portion, said heating element being formed to position said terminal portions in spaced, generally parallel relation and each terminal portion having an end spaced from said intermediate portion which provides for making an electrical connection to a source of current, said terminal portions being adapted to pass through the aperture in said supporting member and said terminal portions being adapted to be secured to said supporting member to position said heat generating portion of said element on one side of said member and to position said terminal portion ends on the other side of said member, a dielectric body having an end reduced in size to provide a radially extending shoulder, said body having opposed slots for receiving respective terminal portions of said element and being slideable therealong toward and away from said heat generating portion, a metallic shield overlying the aperture in said supporting member and protecting said terminal portion ends from the heat produced by said generating portion, said shield having an aperture of a size to fit over the reduced size portion of said body and said shield being carried by the latter in abutting relation with said shoulder and in electrical isolation with said heating element, interengageable means in part provided by said shield and in part provided by said body for holding

said shield and said body together, and resilient means yieldably urging said shield in a direction away from said heat generating portion and to engagement with said supporting member to restrict circulation of air through the aperture in said member.

6. An electric heater, comprising an elongated sheathed heating element having an intermediate heat generating portion and integral terminal portions, said heating element being formed to position said terminal portions in side-by-side relation and each terminal portion having a terminal connector which provides for making connection to a source of current, a disk-like dielectric body mounted on said terminal portions to extend transversely thereof and slidable longitudinally thereof, and a metallic shield protecting the ends of said terminal portions from the heat produced by said generating portion, said shield being carried by said dielectric body and held by the latter out of engagement with said terminal portions.

7. The construction according to claim 6 wherein said disk-like dielectric body has openings extending inward of its periphery for receiving respective terminal portions, and said metallic shield has spaced hook-like members which are disposable through respective openings, relative rotation of said dielectric body and said shield engaging said hook-like members over peripherally located portions of said dielectric body to hold the latter and said shield in assembled relation, and a tension spring having its opposite ends respectively connected to said dielectric body and to said heater adjacent to the ends of said terminal portions for yieldably urging said body and shield in a direction toward said ends.

8. An electric heater, comprising an elongated sheathed heating element having an intermediate heat generating portion and integral terminal portions said heating element being formed to position said terminal portions in side-by-side relation and each terminal portion having a terminal connector, a screw-type plug connected to said terminal portions and having a threaded metallic shell electrically connected to said terminals connectors, said shell being adapted for threaded reception in a screw base which is electrically connected to a source of current, a disk-like dielectric body mounted on said terminal portions to extend transversely thereof and slidable longitudinally thereof, and a metallic shield protecting the ends of said terminal portions from the heat produced by said generating portion, said shield being carried by said dielectric body and held by the latter out of engagement with said terminal portions.

9. The construction according to claim 8 wherein the heater is combined with a support carrying an apertured reflector, said screw base being carried by said support behind said reflector with its screw opening directed toward the rear of said reflector and in alignment with the reflector aperture, said heater being assembled with said support by inserting said screw-type plug through the reflector aperture from the front of said reflector and into the opening of said screw base and rotating said heater to thread the plug into the screw base, said metallic shield overlying said reflector aperture, and resilient means for pressing said shield against a front surface of said reflector.

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