Dec. 30, 1930. R. H. MAXSON 1,786,439

RADIANT ENERGY GENERATING UNIT

Filed May 21, 1927

Fig. 1

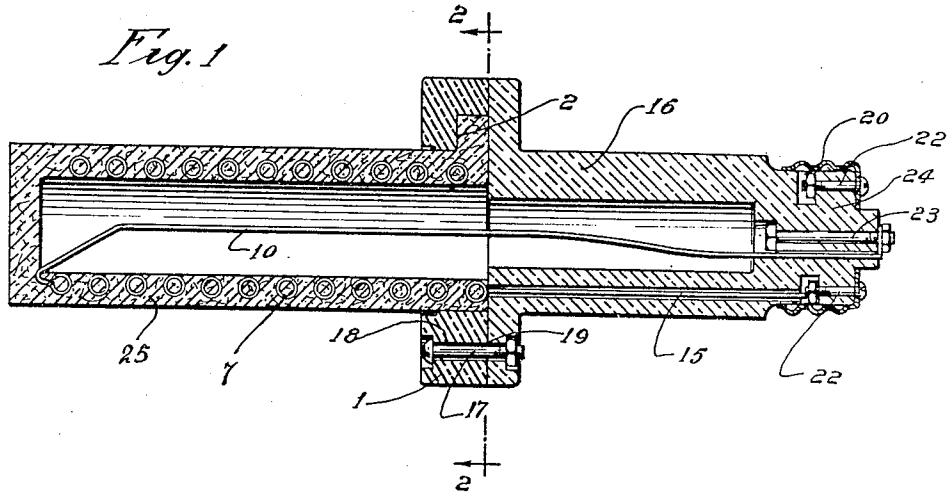


Fig. 3

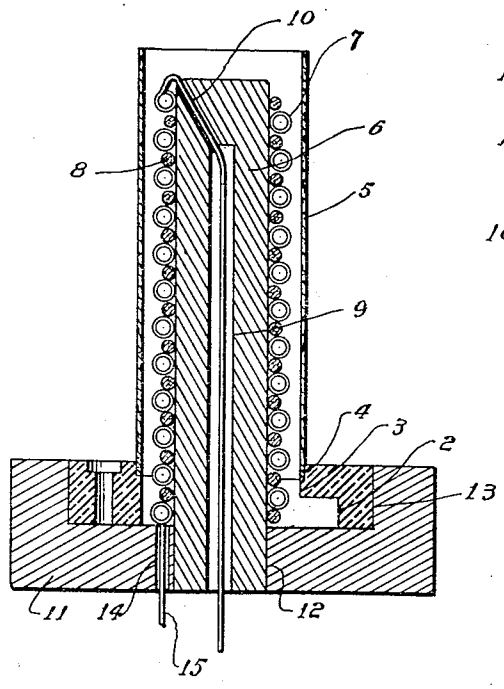
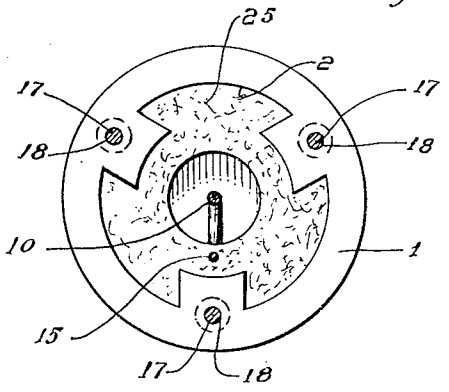


Fig. 2



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UNITED STATES PATENT OFFICE

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RADIANT-ENERGY-GENERATING UNIT

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My invention relates to radiant energy generating units.

It will be explained as embodied in a unit particularly adapted for use in therapeutic lamps for the emission of infra-red rays.

In one type of such unit the conversion of electric energy into radiant energy takes place in a resistance, usually wire, embedded in a refractory envelope which in use is maintained at a temperature sufficient to cause the same to glow. It has been the practice to attach the resistance and its refractory envelope to a suitable support (often in the general form of a lamp-socket plug base) by a central metallic post. Objections to such construction are the relative expense and complication, loss of energy by heat conduction through the post and differences in the coefficients of expansion between the envelope, support and post.

One of the objects of my invention is to provide an improved radiant energy generating unit.

Another object is to provide a unit of the character described in which a novel means is employed for retaining the refractory element, which when in use becomes hot, upon its support of insulating material.

A further object is to provide a unit in which the refractory element is so constructed as to preclude any possibility of breakage due to unequal expansion of the various cooperating supporting elements.

A further object is to provide a unit of the character described which by its novel structure affords maximum energy radiating surface.

Another object is to provide a unit wherein energy losses by heat conduction are very materially reduced.

A further object is to provide a unit of the character described which is of particularly durable structure and which may be manufactured at relatively low cost.

Other objects and advantages will hereinafter appear.

In the drawing:

Fig. 1 is a sectional view of a completed unit;

Fig. 2 is a cross-section on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view of a part of the unit during the process of manufacture.

The construction of the radiant energy generating unit can better be understood by a description of the various steps in the manufacture thereof.

The unit includes a porcelain base member 1, generally annular in form, having segmental rabbeted portions 2 at the rearward end of its bore 3. The forward or outer end of the base is provided with a shallow annular groove 4 concentric with and disposed at the mouth of the bore 3. This groove 4 is for the purpose of supporting a temporary cylindrical shell or mold 5, of paper or other suitable combustible material, which is carried by the base during the process of manufacture in the manner shown in Fig. 3.

A temporary form or core 6, of wood or other appropriate combustible material, is provided and has wound thereupon several turns of an electrical resistance heating coil 7, the turns of which are separated from each other by a combustible cord 8.

The core 6 has a passage 9 extending longitudinally therethrough, through which the outer terminal 10 of the electrical heating coil 7 is passed so as to extend to a point below the bottom of the core.

An annular block 11, of wood or similar combustible material, having a central bore 12 for receiving the lower end of the core 6, serves to close the segmental rabbeted portions 2 of the core. This block 11 has an enlargement 13 of its bore 12 for receiving the base 1.

The block 11 is further provided with a passage 14 extending therethrough through which the opposite terminal 15 of the electrical heating coil 7 extends to a point below the block.

With the parts assembled as thus described and as clearly shown in Fig. 3, the next step in the construction of the unit is that of pouring between the shell 5 and the core 7 a mixture of finely ground carborundum and a binder, such as silicate of soda, in semi-fluid condition which is caused to settle thoroughly

about the heating coil 7 and fill the annular space between the temporary core and outer shell. The partially constructed unit is then put through a drying and baking process during which the parts are heated to a temperature sufficient to thoroughly harden the carborundum and silicate so as to form a self-supporting and hard refractory envelope for the resistance wire heat coil and to entirely consume by combustion the core 6 and the shell 5 as well as the block 11.

Thus far I have described that part of the unit to the left of the line 2—2 in Fig. 1.

The remaining portion of the unit consists in a sub-base member 16 of porcelain, secured to the base 1 by bolts 17 which pass through aligned holes 18 and 19 of the base members 1 and 16 respectively.

This sub-base 16 has as its rear or inner end a standard metallic screw-plug-shell 20 for reception in the standard screw plug receptacle.

The shell 20 is connected to the terminal 15 of the electrical heating coil by one of a pair of bolts 22 employed for securing the shell to the base.

The terminal 10 of the electrical heating coil is secured to a bolt 23 which passes longitudinally through the inner wall 24 of the sub-base 16 and forms the center plug-contact for connecting the heating coil to the center contact of a plug receptacle.

The unit is now in readiness for use. In operation the unit is disposed in the ordinary type plug receptacle by means of the threaded shell 20 thereof, and a suitable reflector may be provided for directing the rays to a predetermined area.

When current is supplied through the shell 20 and the central contact member 23, the electrical heating coil 7 becomes heated and imparts its heat by conduction to the refractory envelope 25.

When used as an infra-red therapeutic lamp, the refractory element is heated to and maintained at a temperature which causes it to glow with a dull red color. At this temperature the emission of infra-red rays from the unit is very intense because of the black color of the envelope. The ratio of conversion of electrical energy into the desired radiant energy is high because there is small loss by heat conduction since the only heat conducting path from the heating coil and its envelope is through the relatively small area of contact between the envelope and the porcelain support.

Due to the novel manner in which the refractory member is interlocked with the base member 1, no additional support is necessary for the refractory member, and thus the member is relatively free from the possibility of rupture from expansion, as is often the case in the present style of heat generators and the like in which an element of refractory material is supported between two supporting members having a coefficient of expansion different from that of the refractory member.

While I have described the details of construction of a preferred embodiment of my invention, it is to be clearly understood that my invention is not limited to these details, but is capable of other adaptations and modifications within the scope of the intended claims.

Having thus described my invention, what I claim is:

1. A radiant energy generating unit, comprising a supporting base member, a sub-base secured to said base member and adapted for partial reception within a receptacle support, a refractory element carried by said base and interlocking with the base, and an electrical heating coil imbedded in the refractory element and having electrical connections terminating at the sub-base.

2. A radiant energy generating unit, comprising a supporting base member, a sub-base secured to said base member and adapted for partial reception within a receptacle support, a cylindrical refractory element supported upright on the base and interlocking with the base, and an electrical heating coil imbedded in the refractory element and having electrical connections terminating at the sub-base.

3. A radiant energy generating unit, comprising a supporting base member, a sub-base secured to said base member and adapted for partial reception within a receptacle support with a recess in its supporting surface, said recess being enlarged at its inner end, a refractory element supported upon said base member and having a portion thereof received within said recess, thereby interlocking the element with the base, and an electrical heating coil imbedded with said refractory material and having its terminals extending to the sub-base.

4. A radiant energy generating unit, comprising a supporting base member, a sub-base secured to said base member and adapted for partial reception within a receptacle support with recesses in its supporting surface, said recesses being enlarged at their inner ends, a refractory element supported upon said base member and having a portion thereof received within said recesses, thereby interlocking the element with the base, and an electrical heating coil imbedded with said refractory material and having its terminals extending to the sub-base.

5. A radiant energy generating unit comprising a support, a sub-base secured to said support and adapted for partial reception within a receptacle support, a refractory element supported on the support solely by interlocking with the support, and an electrical heating coil imbedded in the refractory

element and having electrical connections terminating at the sub-base.

6. A radiant energy generating unit comprising a support with a recess in its supporting surface, a sub-base secured to said support and adapted for partial insertion within a receptacle support, said recess being enlarged at its inner end, a rigid refractory element mounted upon said support and having a portion thereof lying within said recess, thereby interlocking the element with the support, and an electrical heating coil imbedded with said refractory material and having its terminals extending to the sub-base.

7. A radiant energy generating heating unit comprising a support, a sub-base secured to said support and adapted for partial reception within a receptacle support, a refractory element carried by said support and interlocking therewith to form the sole means of holding them together, and an electrical heating coil imbedded in the refractory element and having connecting terminals therefor.

8. In a radiant energy generating unit, a refractory element for emitting radiant energy, a heating coil embedded therein, and a base for said element having a flange extending inwardly and interlocking with a portion of said refractory element and having substantially the same coefficient of heat expansion as the element.

9. In a radiant energy generating unit, a tubular refractory element having an integral end wall, a heating coil embedded in the tubular portion of said element, a base enclosing the end of the refractory element, radially extending interlocking flanges on said refractory element and on said base for positively preventing axial withdrawal of the refractory element and means carried by said base for making electrical contact with the heating coil.

10. In a radiant energy generating unit, a hollow refractory element having an end wall and side walls, a heating coil embedded in the side walls thereof, a hollow base for supporting said element, radially extending interlocking flanges on said refractory element and on said base for positively preventing axial withdrawal of the refractory element and means carried by said base for making electrical contact with the heating coil.

In witness whereof, I hereunto subscribe my name this 18th day of May, 1927.

ROLLAND H. MAXSON.