

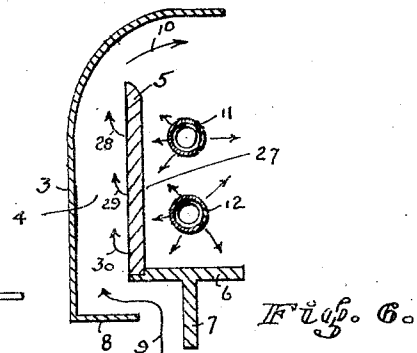
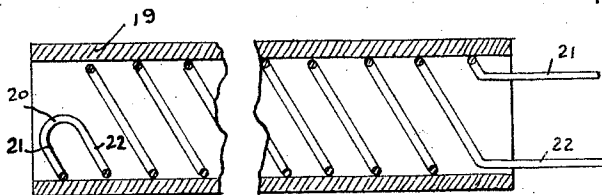
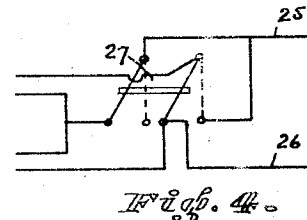
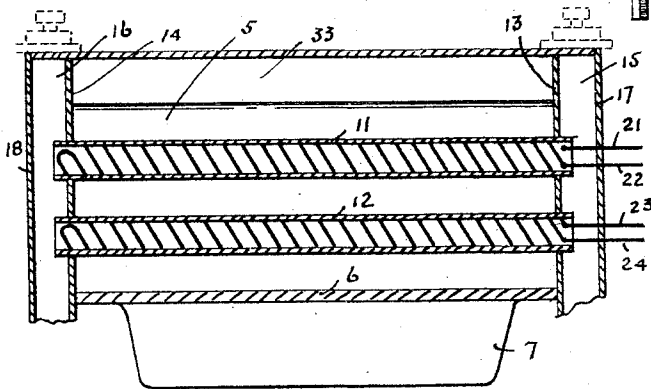
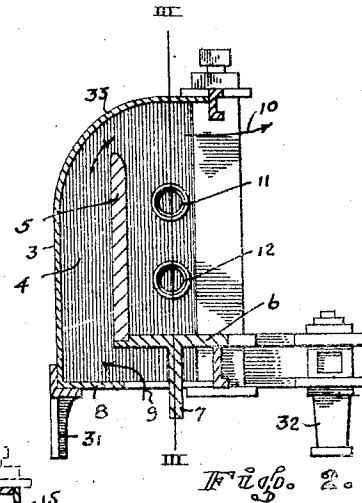
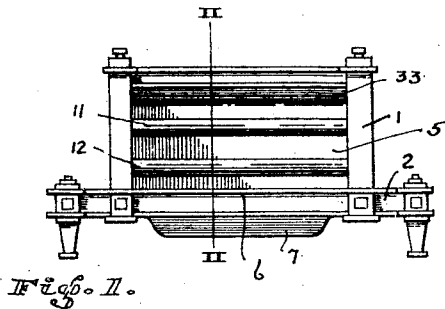
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M. H. SHOENBERG ET AL

COMBINED CONVECTION AND RADIANT HEATER

Filed April 30, 1924



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COMBINED CONVECTION AND RADIANT HEATER.

Application filed April 30, 1924. Serial No. 710,002.

To all whom it may concern:

Be it known that we, MILTON H. SHOENBERG and LESTER SCHON, citizens of the United States, and residents of the city and county of San Francisco, State of California, have invented new and useful Improvements in Combined Convection and Radiant Heaters, of which the following is a specification.

Our invention has for its special object means for most efficiently utilizing electrical energy transformed into heat and for distributing the said heat for the purpose of warming a room or the like.

These objects we accomplish by inclosing an electrical resistance within a shell of insulating material having an extremely low coefficient of expansion and also of low heat conductivity, and for this purpose we prefer to employ quartz or potash-glass or similar substances.

Another object is to inclose an electrical resistance within a cylindrical sheath or casing whereby the said casing is heated when the resistance is energized, the casing itself thereupon becoming a heat radiating body while the resistance is fully protected and held in place against the inner surface of the said casing.

A further object is a heater of the character described wherein the heating element comprising the resistance within the aforementioned casing is mounted in spaced relation with a screen of low heat conductivity, the side of the said screen adjacent the heating element then serving as a reflector of radiate energy emanating from the heating element; and the opposite side of the screen providing a surface heated by conduction and adapted to heat a current of air.

A further object is a heater of the character described wherein a heating element and screen as above described are employed in combination with a passageway through which a current of air is induced by the heat transmitted through the said screen.

A further object is a heater of the character described employing the heating element, the screen and the passageway for heated air, as above described and wherein the passageway is directed outwardly to discharge the heated air in the room or in front of the heated elements.

Other objects will appear from the drawings and specifications which follow.

By referring to the accompanying drawings our invention will be made clear.

Fig. 1 is a front view in perspective of a heater employing our invention.

Fig. 2 is a cross section of Fig. 1 on the line II—II thereof.

Fig. 3 is a section taken at right angles to Fig. 2 and on the line III—III thereof.

Fig. 4 is a diagrammatic showing of energizing and switching connections.

Fig. 5 is a detail showing one way of winding, positioning and holding the resistance wire within the tubular casing.

Fig. 6 is an enlarged fragmentary cross section similar to Fig. 2 and partly diagrammatic to better illustrate the operation of some of the parts.

Throughout the figures similar numerals refer to identical parts.

A frame structure on which the several parts are mounted is indicated by the numerals 1, 2, having preferably the rear plate 3 which may be made of thin metal, fire brick or any desired material in order to establish the channel way 4 between the said plate 3 and the screen 5. The screen 5 is constructed of material of low conductivity as tiles or other clay product and is mounted upon the apron 6 which extends horizontally forward thereof. We have shown a depending rib 7 which has the advantage of increasing the mechanical rigidity and also co-operates with the lower portion 8 of the rear member 5, to establish an inlet for air currents as indicated by the arrow 9, which air currents pass upward are heated and flow into the room to be heated as shown by the arrow 10 as will be more fully explained below.

Mounted horizontally and in front of the screen 5 and spaced therefrom are a plurality of heating elements 11, 12, which extend through the end plates 13, 14, respectively and are supported thereby. The free ends of the heating elements therefore open into the inclosures 15, 16, formed between the end plates or partitions 13, 14, and the cover plates 17, 18, respectively. The heating elements here shown consist of tubes of quartz within which is positioned a spiral winding of resistance wire. One such wind-

ing is shown in detail in Fig. 5, wherein 19 is the outer shell or casing of the heating element within which the double wound spiral resistance wire having the looped end 20 and legs 21, 22, is sprung outward against the inner wall when released from the mandrel on which it is first wound. The mandrel is slightly smaller in diameter than the inner bore so that as the wire is wound on the mandrel its outer diameter will freely enter the tube 19 and then when the wire tension is released on the mandrel it will unwind therefrom until the wire spirals contact with the inner bore of 19. The element 12 has similar terminal connections at 23, 24 and the main energizing connections are shown at 25, 26, with a double throw or other conventional switch as indicated at 27, whereby the heating elements 11, 12, may be operated either singly, in series or parallel as desired.

The operation is as follows: Upon the energization of the heating elements from the connections 25, 26, the heating units 11, 12, become highly heated and throw out radiant energy as indicated by the arrows about the peripheries of their sections in Fig. 6. Portions of this radiant energy pass into the room impinging upon objects and thereby heating them, by transforming the radiant energy into heat energy. Other radiant heat emanations contact against the screen 5 and are then transformed into heat, highly heating the screen 5 which then in turn transfers by conduction its heat to the opposite side of the screen and as indicated diagrammatically by the arrows 28, 29, 30, to the currents of air 9 now rising through the passageway 4. This heated air is now delivered into the room as indicated by the arrow 10. The apron 6 interposed in the path of the downward movement of radiant energy transforms the said energy into heat and thus serves as an additional source of heat convection.

Suitable legs or other supporting means may be employed for mounting the structure on the floor as indicated at 31, 32, and the upper portion of the plate 3 is preferably rounded as shown at 33 to direct the current of heated air 10 in an outward direction towards the room or object to be heated.

By employing quartz for the heat element casing, or other material having low coefficient of expansion and a high electrical and heat resistance to inclose the electrical resistance wire, see Fig. 5, the repeated expansions and contractions which have heretofore resulted in an early destruction of spiral windings is avoided. The wire spirals will with this construction retain their shape and therefore their efficient operation over a much longer period of time.

It will also be seen that in the heating unit of our construction the wire is posi-

tioned within the casing and is therefore protected at all times from mechanical or chemical injury. The construction here shown differs from other heaters in that the tubes are left open on their ends and the ends are therefore retained at a much lower temperature preventing the burning or distortion due to the excessive heating of the wire terminals 22 to 24 inclusive, as also the partition members 13, 14, by which the tubes are supported at their ends.

The screen 5 may be formed of a single element or built up as of tiles, and we prefer for this purpose to employ black or dark colored tiles for the purpose of more efficiently transforming into heat the radiant energy received upon the surface thereof from the heating elements 11, 12, the screen thus becoming highly heated in a short space of time and serving as a most efficient heating means for the air rising through the passageway 4.

The tiles may be glazed or dead finished on their surface and structural varieties introduced to suit the tastes or requirements or decorative effects desired in any particular case without departing from the spirit of our invention.

We claim:—

1. In an electric heater, a heating element of tubular form, a supporting plate for each end of said element, a screen of heat resistant material between said plates parallel but spaced from said element, a back member spaced from said screen, a passageway for air currents between said screen and said member, and said screen provided with a surface adapted to substantially absorb and convert into heat the radiant energy received thereon.

2. In an electric heater, a plurality of horizontally mounted heating elements of tubular form, a supporting plate for each end of said elements, a screen of heat resistant material between said plates parallel but spaced from said elements, a back member spaced from said screen, a passageway for air currents between said screen and said member, and said screen provided with a surface adapted to substantially absorb and convert into heat the radiant energy received thereon.

3. In an electric heater, a heating element of tubular form, a supporting plate for each end of said element, a screen of heat resistant material between said plates parallel but spaced from said element, a back member spaced from said screen, and substantially concave thereto and having a top portion extending over the top of said screen, a passageway for air currents between said screen and said member, and said screen provided with a surface adapted to substantially absorb and convert into heat the radiant energy received thereon.

4. In an electric heater, a plurality of horizontally mounted heating elements of tubular form, a supporting plate for each end of said elements, a screen of heat resistant material between said plates parallel but spaced from said elements, a back member spaced from said screen, and substantially concave thereto and having a top portion extending over the top of said screen, a passageway for air currents between said screen and said member, and said screen provided with a surface adapted to substantially absorb and convert into heat the radiant energy received thereon.

5. In an electric heater, a heating element of tubular form, a supporting plate for each end of said element, a screen of heat resistant material between said plates parallel but spaced from said element, a back member spaced from said screen, a passageway for air currents between said screen and said member and a bottom plate joining said screen and extending forward thereof and a depending rib therefrom forming a wall for one side of the passage inlet, and said screen provided with a surface adapted to substantially absorb and convert into heat the radiant energy received thereon.

6. In an electric heater, a plurality of horizontally mounted heating elements of tubular form, a supporting plate for each end of said elements, a screen of heat resistant material between said plates parallel but spaced from said elements, a back member spaced from said screen, a passageway for air currents between said screen and said member and a bottom plate joining said screen and extending forward thereof and a depending rib therefrom forming a wall for one side of the passage inlet, and said

screen provided with a surface adapted to substantially absorb and convert into heat the radiant energy received thereon.

7. In an electric heater, a heating element of tubular form, a supporting plate for each end of said element, a screen of heat resistant material between said plates parallel but spaced from said element, a back member spaced from said screen, and substantially concave thereto and having a top portion extending over the top of said screen, a passageway for air currents between said screen and said member and a bottom plate joining said screen and extending forward thereof and a depending rib therefrom forming a wall for one side of the passage inlet, and said screen provided with a surface adapted to substantially absorb and convert into heat the radiant energy received thereon.

8. In an electric heater, a plurality of horizontally mounted heating elements of tubular form, a supporting plate for each end of said elements, a screen of heat resistant material between said plates parallel but spaced from said elements, a back member spaced from said screen, and substantially concave thereto and having a top portion extending over the top of said screen, a passageway for air currents between said screen and said member and a bottom plate joining said screen and extending forward thereof and a depending rib therefrom forming a wall for one side of the passage inlet, and said screen provided with a surface adapted to substantially absorb and convert into heat the radiant energy received thereon.

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