Jan. 26, 1960 W. W. HICKS 2,922,866

PANEL ELECTRIC HEATER

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FIG. 1.

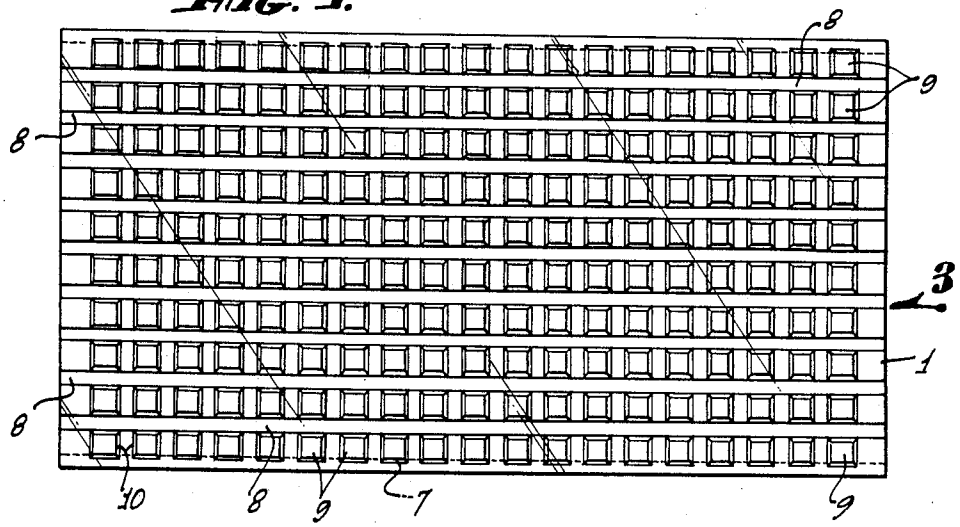


FIG. 2.

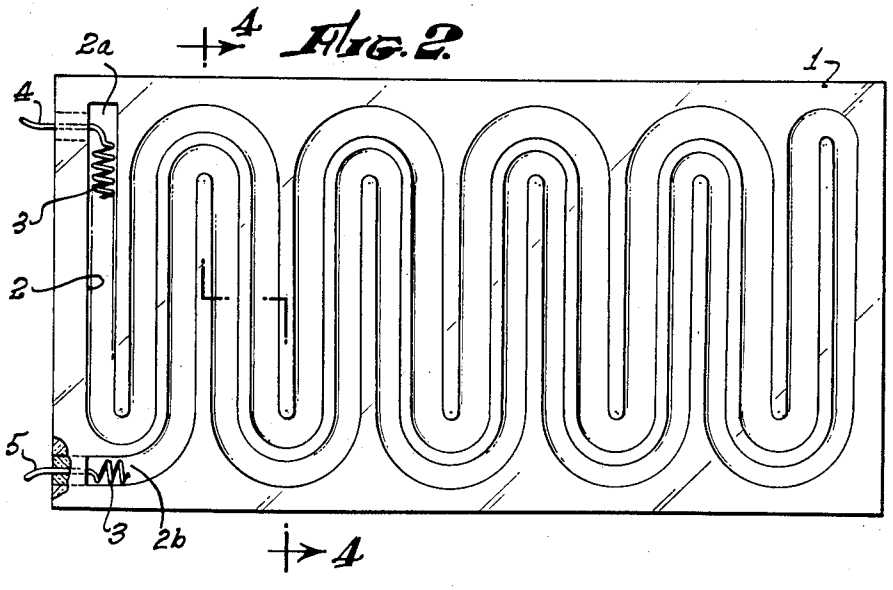
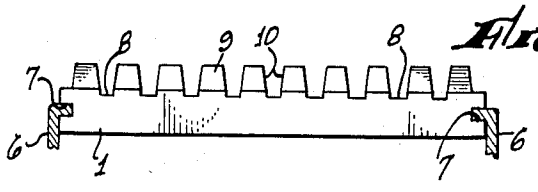


FIG. 3.



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FIG. 4.

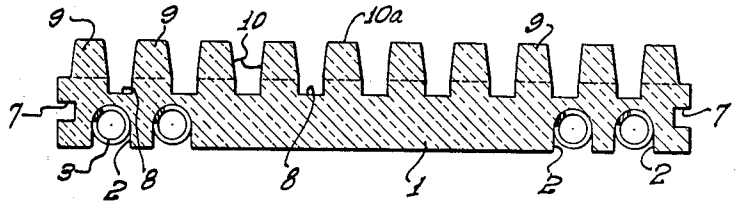


FIG. 5.

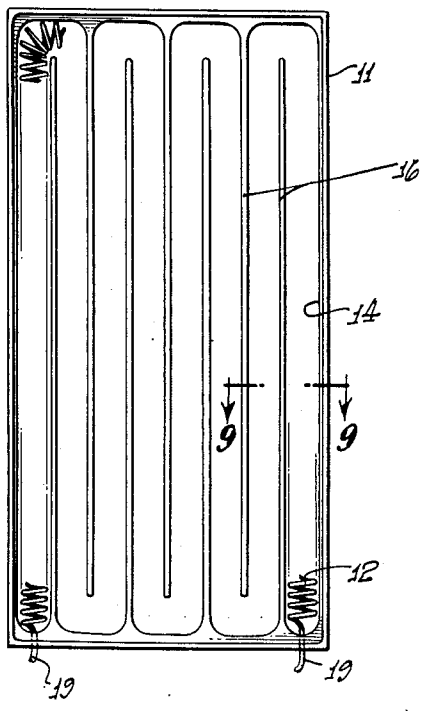
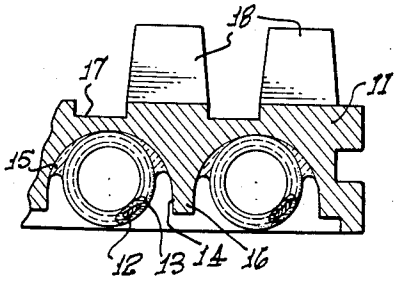


FIG. 6.



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PANEL ELECTRIC HEATER

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Application August 27, 1957, Serial No. 680,503

3 Claims. (Cl. 219—34)

This invention relates to electrical apparatus for heating a space, such as a room, auditorium, or the like.

It is one of the objects of this invention to provide an electrical heater, for this purpose, that is efficient and of simple structure.

It is another object of this invention to provide a heater that can be used as a unit having a panel surface, as on a wall, which radiates heat into the room, and which can be combined with other units for furnishing the required heating capacity.

It is another object of this invention to provide a panel heater of this character in which a relatively large heating surface is produced, thereby making it possible to reduce the temperature at which the surface operates.

It is still another object of this invention to provide a panel structure that can be made of metal or of electrical insulation material, such as glass having high resistance to heat, without any particular difficulty in keeping the electric heating unit appropriately insulated.

This invention possesses many other advantages, and has other objects which may be made more clearly apparent from a consideration of several embodiments of the invention. For this purpose, there are shown a few forms in the drawings accompanying and forming part of the present specification. These forms will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Figure 1 is a front elevation of a heater incorporating the invention;

Fig. 2 is a rear elevation thereof;

Fig. 3 is a side elevation, taken in the direction of the arrow 3 in Fig. 1;

Fig. 4 is an enlarged sectional view, taken along a plane corresponding to line 4—4 of Fig. 2;

Fig. 5 is a rear elevation of a modified form of heater; and

Fig. 6 is a fragmentary enlarged sectional view, taken along the plane corresponding to line 6—6 of Fig. 5.

In the form of the invention illustrated in Figs. 1 to 4, inclusive, the panel-type heater has a body 1. In the rear face of the body 1 is a convoluted groove 2. This groove 2, as shown most clearly in Fig. 2, has re-entrant portions to provide a relatively long, continuous passageway. Lengthwise the groove proceeds in serpentine or convoluted fashion at 2*a* from the upper left-hand end of body 1, toward the right, whence the convolutions reverse and lie close to the first set. In this way, the end 2*b* is close to the left-hand bottom of body 1.

Within the groove 2 is a coiled heating element 3. This heating element extends over the whole length of the convoluted groove 2, the terminals 4 and 5 of the heating unit projecting from the groove ends 2*a*, 2*b* to

the edge of the right-hand side of the body 1. This element is in good heat-transfer relation to the body 1.

The body 1 may be made of either metal, such as cast iron, or glass, or its equivalent. When made of glass, no special provision need be made for insulating the heating element 3 from conducting parts.

A silica-type of glass is preferred, because it will not materially soften even when subjected to the high temperature of the energized element 3. For example, Corning 7900-type is satisfactory. This glass has a composition of ninety-six (96%) percent silica, and the remainder mainly boric oxide.

The arrangement is such that the long sides of the rectangular body 1 may be placed vertically or horizontally as desired. It may be supported, for example, by the aid of holding elements 6 (Fig. 3) engaging in grooves 7 formed on opposite edges of the long sides of the rectangular body 1.

The front face of the body 1 is purposely formed so as to provide a large heat radiating area. For this purpose, the front face carries a series of parallel grooves 8. These grooves are all parallel to the long side of the body 1. Extending outwardly from the front face of the body 1 are a number of projections 9 formed in regular rows. Each projection 9 has sloping sides, to radiate heat transverse to the projections. In the present instance, these projections 9 are shown as frustums of regular pyramids. The bases of these sides 10 which are parallel to the grooves 8 correspond to the upper edges of these grooves, as shown most clearly in Figs. 3 and 4, the channels provided by the grooves being maintained uninterrupted.

The projections 9 are quite long so as to provide substantial sloping areas for the transmission of heat outwardly of body 1, to the space to be heated. Thus, the height of the projections 9 measured from the bottom of grooves 8 constitutes about half the total overall thickness of body 1. Furthermore, since a relatively long electrical heating element 3 is utilized, the temperature attained at the heat-transmitting surfaces of the projections 9 can be quite moderate. The panels can be installed side-by-side, either horizontally or vertically so as to provide a sufficient number of units for producing the desired amount of heat. The radiating surfaces of each projection 9 are made up of the four relatively large slanting sides 10, and the top flat surface 10*a*. These together provide a surface several times greater than if the panel had a plane or flat exposed area. The different sides of the projections 9 provide radiation in different outward directions having components parallel to the panel extending not only from end to end, but also from side to side.

In the form shown in Figs. 5 and 6, the body 11 has generally the same configuration as the body 1. This body is shown as made from metal. Accordingly, the coiled heating element 12 is shown as provided with insulation 13, such as braided glass fiber. The heating element 12 may be held in place in the grooves 14 by the aid of appropriate cement 15.

The groove 14 is made quite deep. Between the grooves are narrow walls 16.

The front face of the body 11 is provided with the parallel grooves 17 and the pyramidal projections 18 arranged as in the form shown in Figs. 1 to 4.

The heating element 11 has terminals 19 projected through appropriate apertures in the wall of the body 11.

The inventor claims:

1. In an electric space heater: a panel made of a glass material, and having a front face and a rear face; and an electric heating element in intimate heat exchanging relationship with the panel at the rear face; the front

face having a plurality of parallel grooves extending substantially from end to end of the panel to form channels; the grooves having parallel sides; said panel also having projections on its front face rising from a base portion of the panel and arranged in a plurality of rows each paralleling the grooves and located between the grooves whereby the radiation area of the panel is increased while the air passage through said channels thereof are maintained effective; said channels extending below the bases of the projections, and the height of the projections above the base portion of the panel being substantially as great as the thickness of the base portion.

2. The combination as set forth in claim 1 in which the projections are in the form of frustrums of regular pyramids converging in a direction outwardly of said front face whereby radiation in directions having components parellel to the grooves is provided as well as in directions having components transverse to the grooves.

3. The combination as set forth in claim 1 in which the projections are in the form of frustrums of regular pyramids converging in a direction outwardly of said

front face whereby radiation in directions having components parellel to the grooves is provided as well as in directions having components transverse to the grooves, those sides of the bases of the frustums adjacent the grooves falling at the edges of the grooves..

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