United States Patent [19]

Needham

[11] **3,767,895**

[45] **Oct. 23, 1973**

[54] **PORTABLE ELECTRIC RADIANT SPACE HEATING PANEL**

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[22] Filed: **Dec. 1, 1971**

[21] Appl. No.: **203,575**

[52] **U.S. Cl.** **219/377,** 165/49, 165/128, 219/342, 219/345, 219/357, 219/367, 219/543

[51] **Int. Cl.** **H05b 1/02,** F24h 3/00

[58] **Field of Search** 219/339–342, 345, 347, 350–358, 377, 366–368; 165/50–56, 128, 130

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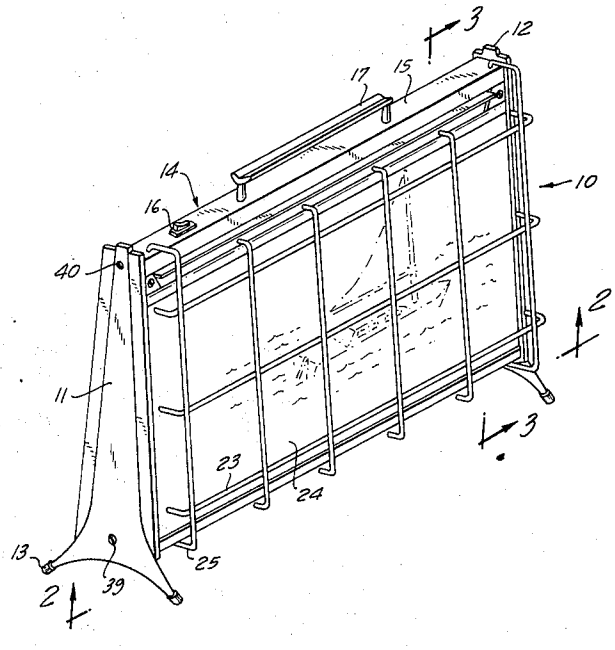
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[57] **ABSTRACT**

A portable electric heater includes side supports which hold a metallic heating panel having a front face provided with a decorative baked enamel design. The rear face of the heating panel has an insulative coating having a resistive heating grid deposited thereon which is connected to a source of current through a switch. A protective panel are spaced, respectively, from the front and rear of the heating panel. A sheet metal back panel is secured to the side supports in spaced relation to the rear of the reflector panel. Convection air currents flow through the space between the heating panel and reflector panel and between the reflector panel and back panel to supply some heating air and to keep the heater relatively cool for safety.

3 Claims, 6 Drawing Figures



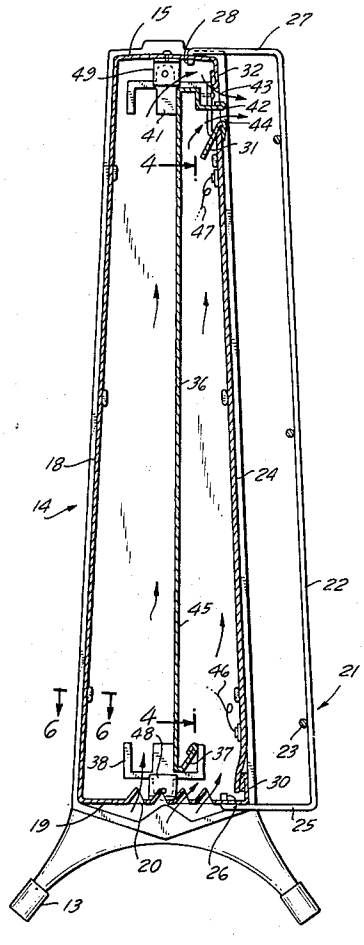
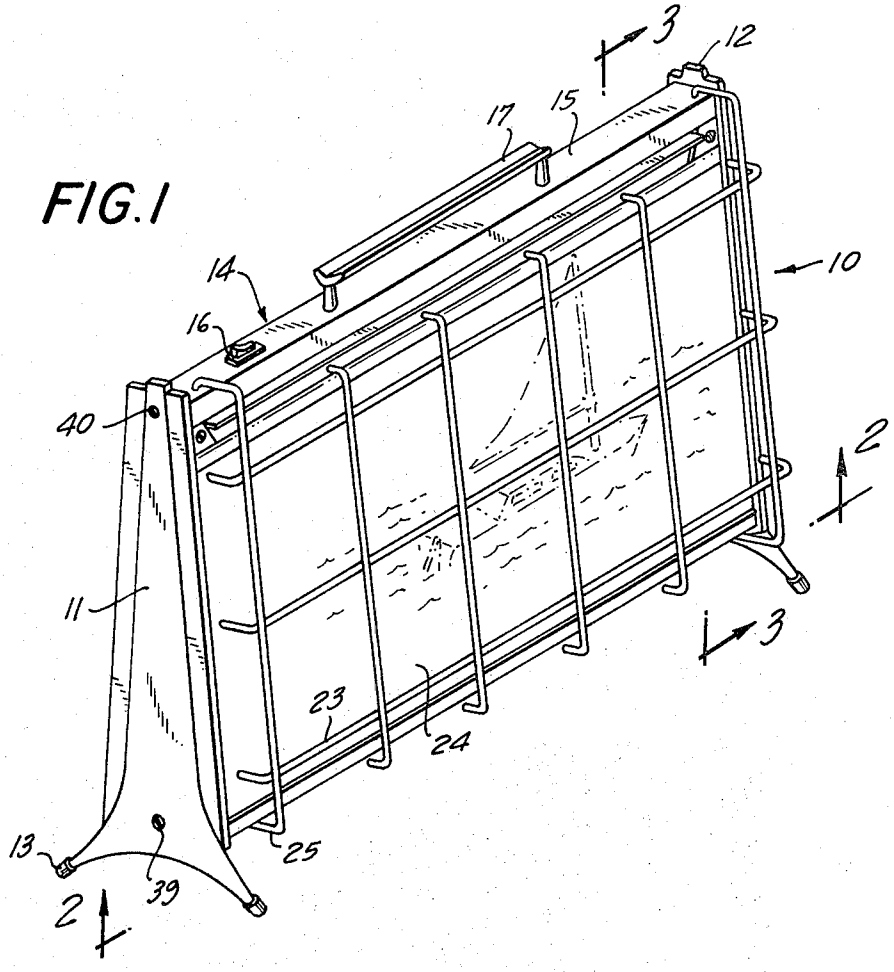


FIG. 1



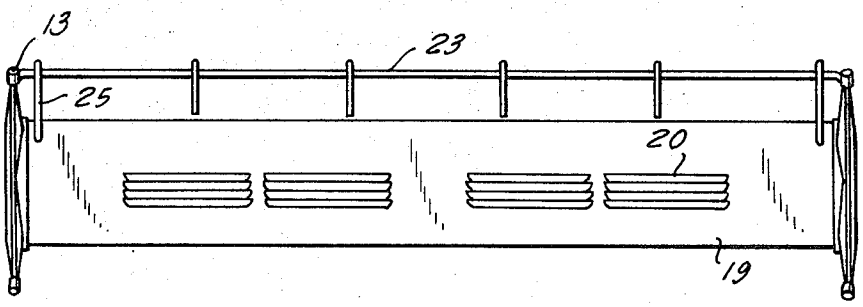


FIG. 2

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FIG.3

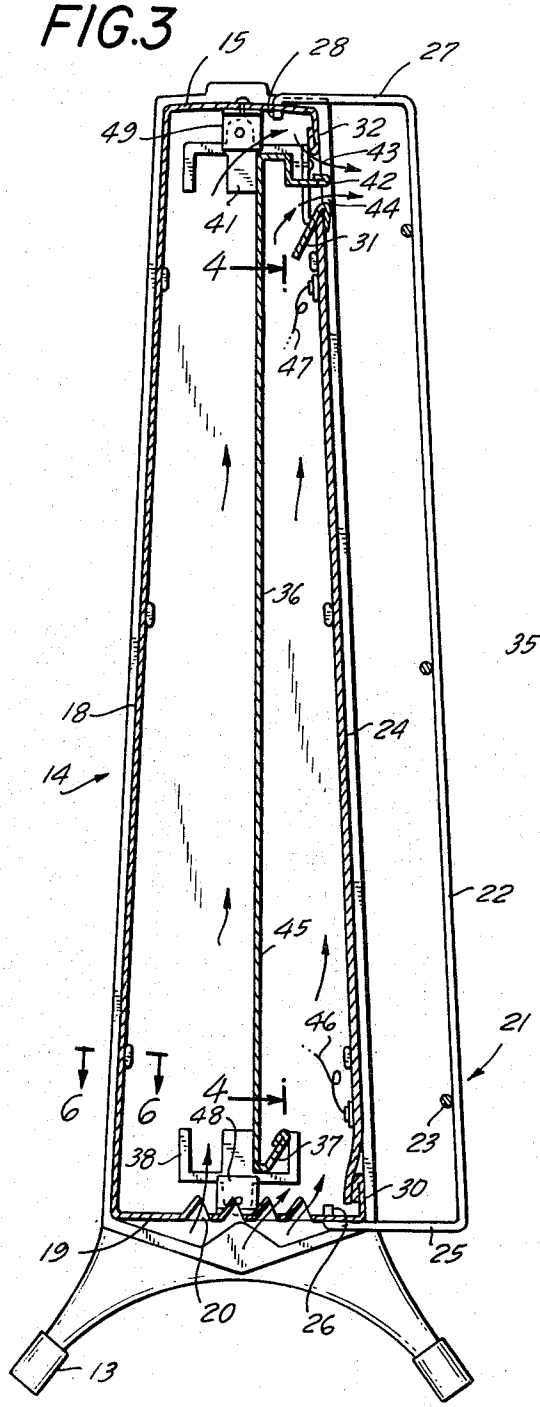
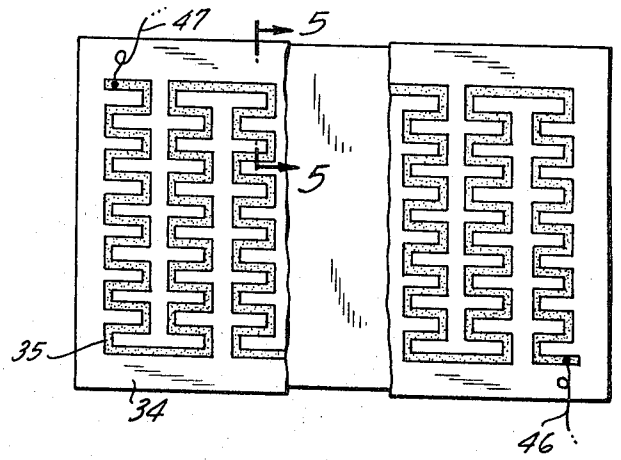


FIG.4



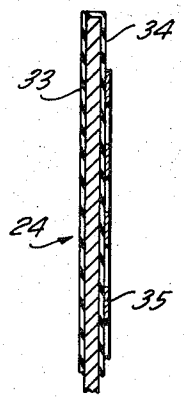


FIG.5

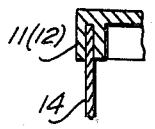


FIG.6

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PORTABLE ELECTRIC RADIANT SPACE HEATING PANEL

BACKGROUND OF THE INVENTION

Electrical space heaters have long been used for heating, particularly for supplementing the regular heating system in a home or place of business. In one type of electrical heater a band or wire is heated to incandescence by electricity and air is passed over the hot wire or band either by a fan or by convection air currents. Such heaters may present a fire danger as their wire or band, and often their casing, is at a high temperature. In addition, they may not be efficient as they heat the air in the room rather than the people in the room by radiation and the excessive air currents they cause may stir up dust and allergenic particles.

Another type of electric heater is called a radiant heater because the heat is transmitted primarily by infra-red radiation. In one type of radient heater a pattern (grid) of electrical resistor lines are etched on a tempered glass panel and the resistor lines are connected, by wires, to a source of household a.c. current. Some radiant heaters also provide some heating of air by flow of the air over parts of the heater. One drawback of radiant heaters is their appearance. The resistor lines must be of a certain width and spaced a certain distance apart for proper functioning. For example, to provide 3,500 BTU's of heat per hour, a glass panel 1-½ feet by 2-½ feet may be required. Such a large apparatus, in which persons see only a patterned glass, is not particularly attractive. In addition, the glass presents the danger of breakage, which is particularly disadvantageous in portable units.

SUMMARY OF THE INVENTION

The present invention provides a portable electrical heater which is attractive in appearance, relatively efficient, safe in operation and may be carried from place to place without being damaged. The heater includes side supports which hold a metal heating panel. The front of the heating panel is a decorative baked enameled colored picture intended to be viewed by persons in the room. The back of the heating panel has an insulative coating and, upon the insulation, there is a heating element consisting of a metallic electrical resistant grid. The grid is connected to wires which lead, through a switch, to a current source. The heater also includes a protective metal grill and a reflector panel which are spaced, respectively from the front and rear of the heating panel. A sheet metal housing is secured to side supports and arranged so that air is drawn, by convection air currents, through the space between the heater panel and the reflector panel and also through a space between the housing and the reflecting panel to supply some heating air and to keep the heater relatively cool for fire prevention and to provide a heater that may be readily moved at any time without the danger of burning the user upon accidental contact with the frame of the heater.

OBJECTIVES OF THE INVENTION

It is the objective of the present invention to provide an electric heater which: (a) is safe to use because the heat of its housing and heating panel are relatively low and below the kindling point of almost all the matrials they may acciden-tally contact and may be readily transported at any time without the danger of burning

the user upon accidental contact with the frame of the heater; (b) provides an aesthetically pleasing, ornamental and decorative effect in a room; (c) is relatively steady and may be moved and shipped without great danger of breakage because it does not use a glass panel; (d) is relatively efficient because it heats primarily by radiation and yet also provides some heating by convection air currents; and (e) may be used with any source of household a.c. current.

Other and further objectives of the present invention will be apparent upon an understanding of the illustrative embodiment described below or will be apparent to one skilled in the art upon employment of the invention in practice.

BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment has been chosen for describing and illustrating the principles of the present invention and is illustrated in the accompanying drawings, wherein:

FIG. **1** is a perspective view of the radiant heater according to the present invention;

FIG. **2** is a bottom elevational view of the radiant heater of FIG. **1**;

FIG. **3** is a sectional view taken along line **3—3** of FIG. **1**;

FIG. **4** is a sectional view taken along line **4—4** of FIG. **3**;

FIG. **5** is an enlarged sectional view taken along line **5—5** of FIG. **4**; and

FIG. **6** is an enlarged partial view, which is a sectional view, taken along line **6—6** of FIG. **3.**

DETAILED DESCRIPTION

Referring to the drawings, the portable heater shown therein is particularly adapted for use in a household or other room where it will be exposed to view. The heater is portable and equipped with legs so that it stands freely on the floor adjacent items of furniture or the like.

The radiant heater **10** includes a first end support **11** and spaced thereto a second end support **12.** The end supports are preferably made as metal castings. Each of the end supports **11** and **12** have two supporting legs adapted to sit on the floor with rubber protective cups **13** covering the ends of the legs to protect an underlying rug or polished floor. A sheet metal housing **14** is held between the end supports **11** and **12** and the top flange of the housing **15** has attached thereto an illuminated on-off switch **16** and a handle **17.**

As shown in FIGS. **2** and **3,** the housing **14** has a back panel **18** which is formed integrally with a top flange **15** and a bottom flange **19.** The bottom flange has a series of elongated openings **20** through which convection air currents pass in an upwards direction to keep the heater body relatively cool for ready transport and fire prevention. A chrome plated protective grill **21** has generally vertically arranged stiff rod members **22** which are molded to horizontally positioned stiff rod members **23.** This grill is used to protect users from accidentally touching the heating panel **24** and to prevent objects from striking against it. The two end vertical stiff rod members **22** each have an integral inwardly turned horizontal portion **25** whose end **26** turns up and fits in a hole in the bottom flange **19** of the metal housing. Similarly, the top inwardly turned horizontal portions **27** of the two end stiff metal rods are turned

down at ends 28 and fit within matching holes in the top flange 15 of the sheet metal housing.

An upraised lip 30 of the sheet metal housing 14 is used to mount the heating panel 24 at its lower edge. At its upper edge the heating panel 24 is held within a groove formed by a turned-back edge 31 of the front flange 32 of the sheet metal housing 14.

As shown in FIGS. 4 and 5 the sheet metal heating panel 24 is of sheet metal which is approximately one-sixteenth of an inch thick. This thickness is appropriate for a heater having a surface area of 1-½ feet by 2-½ feet. This size of heater, constructed according to the present invention, will produce about 3,400 BTU's per hour and consume 1,000 watts of power (8-½ amps) operating from a household 110-volt a.c. source of current.

Advantageously the heating panel 24 has a decorative and ornamental picture on its front surface 33 such as the representation of an enameled painting of a boat, landscape or other scene. The enameled painting may be formed by silk screening the different colors on the front surface with glazing material held in a liquid suspension and then heating the panel to dry off the liquid solvent and to fuse the glazing materials to the underlying metal panel.

After the picture is formed on the front surface, a protective insulative coating is formed on the back surface of the panel. Preferably the insulative coating 34 is an insulating enamel having a thickness of 0.001 to 0.002 inches after drying and baking. A patterened grid 35 of heating elements is formed on top of the insulating coating 34 forming an electrical resistor heating element. Wires 47 and 46 lead from a source of household current (not shown) to the ends of the conductive grid 35.

A reflective sheet metal baffle 45, preferably of shiny aluminum sheet metal, is positioned between the back of the sheet metal heating panel 24 and the front of the back panel 18 of the sheet metal housing 14. The front face of baffle 45, which faces the back of the heating panel, reflects infra-red radiation which it receives from the grid 35 back onto the heating panel 24 and helps heat the panel 24. The panel 24 is thus advantageously heated by the grid 35 and by heat reflected back from the baffle 45 so that most of the heat produced will be radiated from the front or decorated side of the heating panel 24 which will be placed to face the user or the part of the room to be heated. The sheet metal baffle 45 is of the same area as the heating panel 24. The bottom 37 of the baffle 45 is turned upward and held within the groove formed by a bottom supporting clamp 38. A similar top support clamp 41 holds the top of the baffle 45.

The bottom and top clamps 38 and 41 are integral with the support casting 12, similar clamps being provided on support 11. A fastening means, such as screw 39, connectes an angle clip 38 to the end support 12 and the angle clip is riveted to the sheet metal housing 18. Similarly a fastening means, such as screw 40, connects the support casting 12 to an angle clip 49 which is riveted to the top flange 15. As shown in FIG. 6 the side edges of the sheet metal housing 14 are held in grooves (slots) of the end support castings 11 and 12.

As shown in FIG. 3, convection air enters through the openings 20 in the bottom of the heater and flows upward both in front of and in back of the sheet metal baffle 45. The air passes over the heating panel 24 and baffle 45, thereby cooling the heating panel and baffle and becoming heated. The air exits from the heater through the openings 43 and 44 which are, respectively, between the turned-over edge of the front flange 32 and a top flange 42 of the baffle 45 and between that flange 42 and the lip 31 of the metal housing, which holds the top of the heating panel 24. This heated convection air passing between the heating panel 24 and baffle 45 helps to heat the room. While the convection air passing between the back panel 18 and the reflective baffle 45 also aids in heating the room, the primary function of this later flow of convection air is to keep the temperature of the heater body relatively cool and not more than 10° F. above the room temperature. To accomplish this end the space between the back panel 18 and the baffle 45 is made at least 1-½ times the space between the baffle 45 and the heating panel 24. In addition the back panel 18, the baffle 45 and heating panel 24 converge toward each other from bottom to top to enhance the flow of convection air.

What is claimed is:

1. An electrical heater including a radiant heating panel; a back panel; and reflector panel disposed between said heating and back panels; said heating panel being a metal sheet having a front face with a decorative design thereon and a rear face with an insulating enamel coating with an electrically resistive heating grid formed thereon; support means holding said three panels in spaced converging relationship from bottom to top to enhance the upward flow of convection air through the heater; said support means including side support members carrying clamps to support said reflector panel and wherein said back panel is secured to said side support members; said back plate having a bottom and a horizontal top flange thereby defining a housing with an open front face, and said radiant heating panel being supported by said top and bottom flanges of said back panel and positioned in the open front of said housing with the front face of said radiant heating panel exposed through said open front; said back panel bottom flange having openings therein communicating with a first converging air passage formed between said reflector panel and said back panel and with a second converging air passage formed between said radiant heating panel and said reflector panel; and wherein the upper end of said first converging air passage is formed by the horizontal top flange of said back panel and the upper surface of a horizontal flange on said reflector panel, said horizontal top flange of said back panel and said upper surface providing a generally horizontal upper air passage directing the flow of air out through an opening disposed in the front of the housing above the heating panel; the upper end of said second converging air passage being formed by the under surface of said top flange of said reflector panel, said under surface of said top flange being generally horizontal and directing the flow of air out through an opening disposed in the front of the housing above the heating panel; and wherein said side support members form the side walls of said first and second converging air passages.

2. The electrical heater of claim 1 wherein said support members each have grooves within which are fitted the ends of said back panel.

3. The electrical heater of claim 1 having a protective grill secured to said back panel, said grill being spaced from the front face of said heating panel.

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