Nov. 13, 1956 E. W. RAZLAG 2,770,704

RADIANT HEATERS

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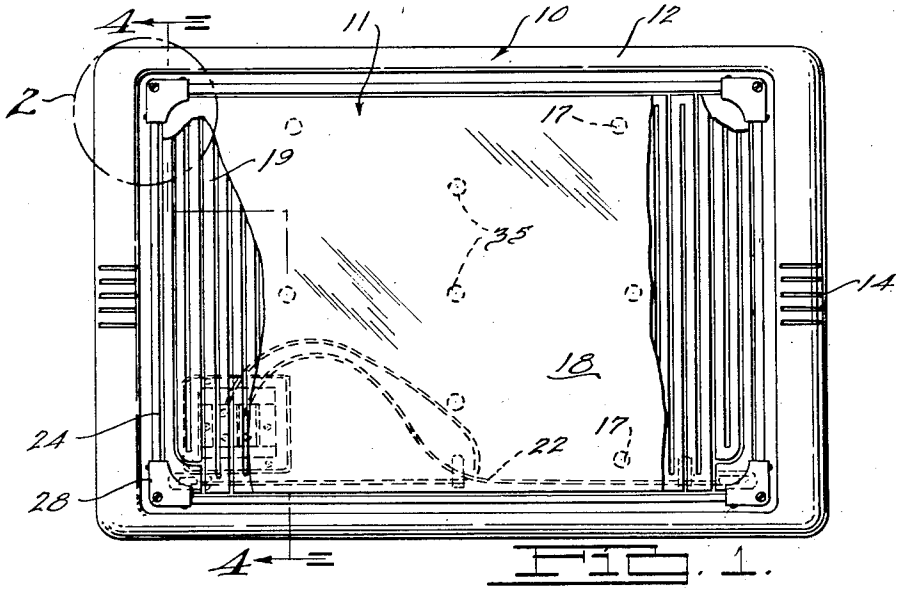


FIG. 1.

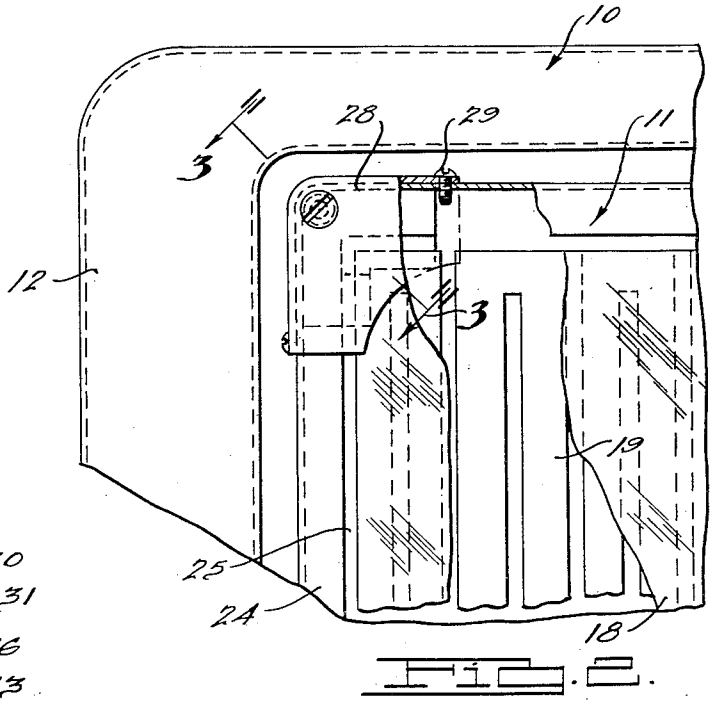


FIG. 2.

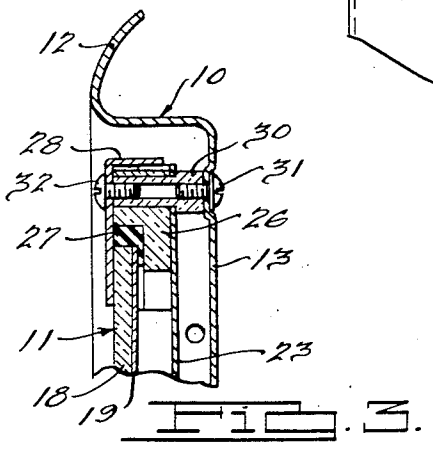


FIG. 3.

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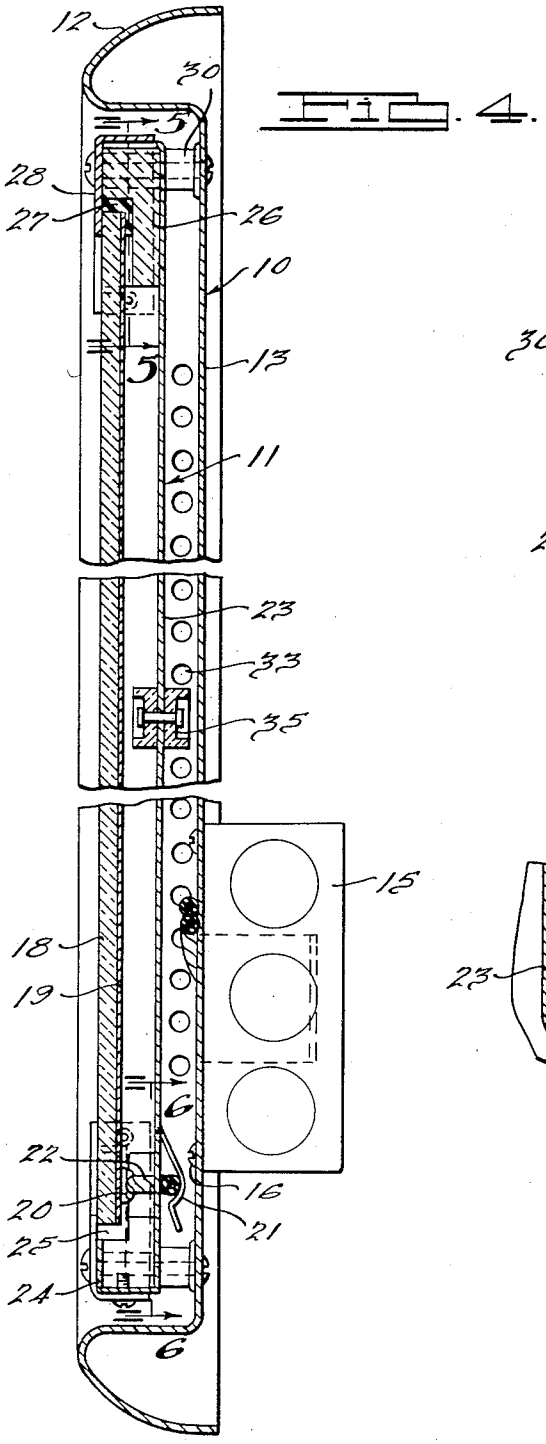


Fig. 4.

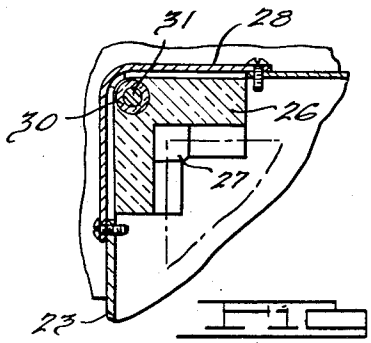


Fig. 5.

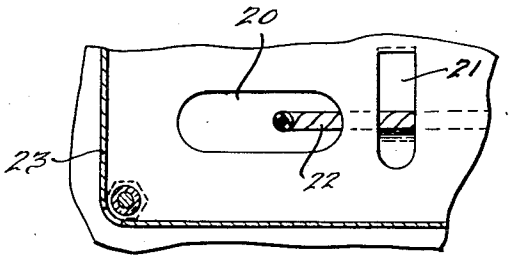


Fig. 6.

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RADIANT HEATERS

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Application January 31, 1951, Serial No. 208,738

4 Claims. (Cl. 219—34)

This invention relates to space heaters and electrically energized space heaters in particular.

More specifically, the invention is concerned with heating panels for wall or ceiling mounting wherein the heating element is of sheet form and preferably of glass or similar material treated in such manner that it is capable of emitting infra-red rays when connected to a source of electricity.

The prime object of my invention is to provide an improved heating panel wherein the heating element is supported by simple means which permits the element to expand and contract yet retains it against rattle and undesired movement in shipping and handling.

Another object is to provide, in a heating panel of the aforesaid type, simple and economical, yet rugged means for installation of the device, permitting necessary disassembly and reassembly with minimum consumption of time.

Other objects and advantages of the invention will become apparent from the following description which, taken in conjunction with the accompanying drawings, illustrates a preferred embodiment of my invention.

In the drawings,

Fig. 1 is a front elevation of the panel as it appears when mounted on a wall with parts broken away to show details;

Fig. 2 is an enlarged detail, partly in section, showing a position of the Fig. 1 panel as indicated by the letter "A" thereon;

Fig. 3 is a section along the line 3—3 of Fig. 2;

Fig. 4 is an enlarged section along the line 4—4 of Fig. 1, and

Figs. 5 and 6 are sections along lines 5—5 and 6—6 respectively of Fig. 4.

Referring to the figures it may be seen that my improved heating panel assembly comprises a dished base **10** in which is disposed the heating sub-assembly generally designated by numeral **11**. The base **10** is preferably made of a single sheet of steel or aluminum and is provided with a decorative peripheral flanged border **12** and a flat central section **13**. The border flange is reversely bent as is more clearly shown in Fig. 4 and terminates rearwardly of the plane of the central section. Horizontal indentations **14** or other ornamentation may be provided in the border **12** to enhance the appearance of the unit.

A junction box **15** of any type approved by the Underwriters Laboratories is affixed to the base section **13** by screws **16** and is adapted to receive the line connections of armored cable or the equivalent in accordance with the installation code of the locality. Holes **17** (Fig. 1) are provided in the base section **13** for installation purposes. The panel is constructed to be installed flat against a wall or ceiling, it being necessary to provide one opening only to accommodate the junction box **15** and this opening is usually at the point where the electrical cable terminates, so it can be seen that the heating panel is installed with minimum alteration of the supporting structure.

The heat emitting sub-assembly **11** comprises a heating

element **18** of sheet form. In the preferred embodiment shown, the element **18** is a sheet of tempered glass with a grid **19** of aluminum, silver or other metallic alloy fused to the back thereof. The grid **19** is of continuous ribbon-like form and terminates at each end in a metallic slug **20** which is connected by suitable connecting means **21**, **22** to terminals (not shown) in the junction box.

The glass plate **18** is carried in a sub-frame **23**, which is preferably constructed of polished aluminum. The frame **23** is larger in area than the plate **18** and has a reversely bent marginal flange **24** of such size that when it is assembled with the plate, slight clearance is provided which permits expansion of the plate and circulation of air, but is not sufficiently large to permit insertion of the fingers.

At each corner of the sub-assembly, a ceramic block **26** of generally triangular shape is positioned. This block has a triangularly shaped stepped portion forming a recess adapted to receive a corner of the plate **18** as shown in Figs. 3 and 4. In this recess, between the plate and the block, a pad **27** of resilient, heat-resisting, dielectric material is inserted. This pad is preferably made of silicone rubber and performs an important function in the assembly. Because the plate **18** heats rapidly from room temperature to approximately 300° F. when energized, some expansion of the plate must occur which prohibits rigid mounting thereof. In prior devices, the plate was loosely mounted to allow for necessary expansion and contraction. This was objectionable because plates were broken in shipment and users disliked movement and rattle of the plate in use.

The plate **18**, block **26** and pad **27** are retained in assembled relation in the frame **23** by means of four corner retaining members **28** which are secured to the frame by screws **29**, reverse flange **24** being cut away at the corners. The retainers **28** are of approximate triangular shape and when secured in place at each corner, retain the parts in place without movement.

As can be seen in Fig. 3, each of the blocks **26** is provided with an opening which aligns with openings in the frame **13** to accommodate a mounting member **30**. The latter may be of metal or other rigid material and has an enlarged portion forming a shoulder on which the sub-assembly **11** rests. The mounting members **30** are secured to the main frame **10** by screws **31** and similar screws **32** are provided to secure the sub-assembly in place. Accidental contact between the plate **18** and the frame **23** and between the latter and the main frame **13** is prevented by ceramic spacers **35** which are secured back-to-back at several places in the frame **23** (Figs. 1 and 4).

When shipped to the customer, the panel is completely assembled as illustrated. Installation is then a quick and simple matter. The installation man simply removes the four screws **32** which permits access to the holes **17**, the separation of the main frame and sub-frame being permitted by the flexible conductors **22**. After the main frame has been secured to the supporting structure and the electrical supply lines connected into the junction box **15**, the screws **32** are replaced and the panel is ready for operation. Any maintenance work which may be necessary during the life of the panel can be quickly accomplished by removal of the screws **32**. If the plate **18** is broken or damaged, the entire sub-assembly **11** may be easily removed, the wires **22** disconnected from the box **15** and a new assembly substituted.

As shown in Fig. 4, the main frame **10** is provided with apertures **33** to facilitate circulation of air. While the major function of the panel is to heat by radiation, some convection heating is inherent and the panel is constructed to take full advantage thereof. Air currents circulate between the main frame and the sub-frame

through the space between the frames at the bottom and sides thereof and through apertures 33, and similar circulation takes place between the bottom of the plate 18 and the sub-frame as permitted by the opening 25. The surface of the sub-frame 23 facing the plate 18 is preferably polished to reflect heat rays emitted from the rear or bottom surface of the plate.

It may thus be seen that I have provided a simply constructed radiant heating panel that is rugged in construction, easy to install and which embodies features designed to extract maximum heating efficiency.

While I have shown for illustrative purposes, but one embodiment of the device, it is obvious that changes in the size, proportions and precise arrangement of the parts may be made without departing from the invention in its broader aspects as set forth in the appended claims.

I claim:

1. A radiant heating panel comprising a dished frame member adapted for attachment to a supporting surface; a secondary frame; means mounting a heating plate in said secondary frame, and mounting means comprising posts carried by said frame at each corner thereof within the dished portion thereof, said posts each being provided with a reduced portion adapted to be received in an opening of a rigid heat resisting block mounted thereon, a recess in each of said blocks for receiving the corners of said heating plate and means carried by said posts for securing said secondary frame and plate in the dished portion of said first frame member is spaced relation thereto such that air currents may circulate around all sides of said secondary frame.

2. In a radiant heating panel, a flat plate adapted when electrically energized to emit heat rays; a frame carrying said plate, said frame comprising a flat sheet metal member having marginal reversely bent flanges spaced from the main portion thereof; means mounting said plate in said frame such that the front surface of said plate is

in substantially the same plane as said flanges comprising blocks mounted at each corner of said frame within the recessed portion thereof, said blocks having recesses for receiving the corners of said plate and pads of yieldable heat resisting material disposed between the plate and blocks permitting movement incident to expansion and contraction thereof.

3. In an electric heater, a panel-like glass heater plate having a rear face provided with an electric resistance heating element, a frame for the plate, a bracket behind each end of the plate, means connecting the bracket to the frame, a lug detachably connected to each bracket and overlying a small area of the outer face of the plate to hold the plate in the frame, and means compressed between the brackets and the back of the plate and pressing the plate forward against the lugs.

4. In an electric heater, a panel-like glass heater plate having a rear face provided with an electric resistance heating element, a frame for the plate, a bracket behind each end of the plate, the bracket having side wall extending forward across the ends of the plate and provided with holes, means connecting the brackets to the frame, a lug at each end of the plate overlying a small area of its outer face to hold the plate in the frame, screws extending through the lugs and into said holes to fasten the lugs to the brackets, and means compressed between the brackets and the back of the plate and pressing the plate forward against the lugs.

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