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(54) Title: PANEL HEATERS

(57) Abstract: A panel heater with enhanced safety means adaptable as room heaters disposable on walls, or floor, comprising: - A flat panel heater (B) comprising filled oil using electrical energy alternatively a heating panel where heated wire is covered with Electrical insulating material is accommodated inside a flat covering panels which is supplied with electrical energy from conventional source and is mounted on wall or floor mounting- when provided with at least one protrusion on top of the panel or alternatively one at the top and other at bottom so that when covered by a cloth or felt creates air gap and reduces the temperatures attained on panel surface and the covered cloth significantly, thereby enhancing safety levels to prevent fire hazard.



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TITLE

Panel heaters

FIELD OF INVENTION.

The invention relates to panel heaters. More particularly, the invention relates to a panel heater with enhanced safety means.

BACKGROUND OF INVENTION

US 4728780 discloses panel heaters which are used as room heaters, disposed on walls, ceiling or floors. The panel heater is incorporated with a heating pipe, an electric heating wire running through it and aluminum granules stuffed between the two. Because spherical aluminum granules are closely packed, the heat conductivity of such panel heater is very good, which minimizes the heat loss and reduces the time to heat up a room. An automatic on-off switch is generally provided to control room temperature.

- 1) There also panel heaters used as room heaters disposed on wall ceiling or floor. These heaters have electrical heating element incorporated in oil which heats up the panel and the panel radiates heat into surrounding medium. In a variation electrical heating element embedded in resinous electrical insulants that are thermally conducive and embedded in between covered metal or non-metallic panels facing sheets are also made.

Such panel heaters when used at heights less than 6'ft from floor level are provided with safety precautions not to cover the panels as this can elevate temperatures and result in fire hazards. The statutory instructions for example, IEC 60335-2, and UL 2021 respectively stipulates that when the heater is covered with 25-mm felt, the temperature of such coverings should not exceed 150 deg centigrade, and that when covered with specified materials they should not get ignited glow or emit embers.

- 2) While the experiment deals with specified materials there is always possibility of more non-conductive materials used as covering such as higher thickness material or much lower thermal conductive material that can far exceed the limit temperature and present a possible fire hazard.

OBJECT OF THE INVENTION

It is therefore an object of the invention to propose a panel heater which can maintain higher safety standard and will not raise temperatures and simultaneously maintain the stipulated requirement of the statutory standards even for coverings of lower conductivity thermal.

SUMMARY OF THE INVENTION

Accordingly there is provided an improved panel heater in which each of the top front faces and the bottom front faces of the panel, are provided with at least one protrusion extending between 6mm to 25mm by maintaining higher thickness at the protrude portion. Width of the protrusions can be selected as is

convenient. Protrusions can be integrally, configured during manufacturing of the panel covering, or could be provided with separate protrusion fixed to panel covering subsequently. The protrusion members can either be configured as a continuous member or can be provided at specific intervals across the length of the top and bottom edge of the panel.

The protrusion members can be shaped to add to presentable look of the heater. Further projection at the center of the panel can be added depending on size of panel.

Such a construction ensures creation of an air gap between the panel's surface and the covering material, (1) This not only avoids direct contact but will also provide some heat transfer due to air gap during test for a possible abnormal or erroneous operating. (The gap thus can be fixed relation to surface temperature of panels and allowed raise of temperature of any covering). By adjusting the dimension of the air gap, the temperature of the covering material can be controlled.

BREIF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

- Figure 1 (a) Shows a prior art single-wall mounting panel heater.
- Figure 1 (b) Shows a single-wall mounted panel heater according to the Invention.
- Figure 1 (c) Shows a panel heater with protrusions according to the invention.

Figure 1 (d) Shows both sides of a panel heater according to the present invention.

DETAIL DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

As shown in figure 1(a), a panel heater (B) according to prior art is mounted on a wall (A) via its mounting legs (E). When the heater is covered with material such as felt (C). The covering (C) touches the panel (B), thereby reaching instantaneously with switching on of the heater nearer to the surface temperature of the panel (B).

Heat removed from a panel per unit area is dependant on thermal conductivity and thickness of the covering for 1 deg centigrade temp difference. Hence temperature of the panel increases to maintain required difference of temperature to transfer all the heat generated through the covered material.

Fig 1 (b) shows the effect of protrusion members (D) provided at bottom and top according to the invention, which creates air gap between the panel surface (B) and the covering material (C) and the panel (B).

In case, the panel (B) is reachable on either side and can be subjected to such abnormal operation, the edge projection (D) should be used on both sides of the panel (B) as shown in fig. 1(d).

This invention is applicable for all panel heaters whether fixed or movable and electrical or oil filled of any material and where a possibility exists for abnormal operation by covering the heater.

For data of typical experiment shows distinctive advantage of this improved construction with protrusions of 15mm and 20mm. The panel is covered by felt 50% thicker than 25mm specified in test standard to demonstrate its effectiveness.

Typical panel Test Data

600 x 600 mm nominal size

Rating 420 watts.

(Covering is 50% thicker than standard felt covering of 25mm as required by test standards)

	Temperature when covered with felt	Temperature when covered with felt	Temperature when covered with felt.
Location of temp measurement	Flat panel without protrusion	Panel with 15mm protrusion	Panel with 20 mm protrusion
Temperature of Panel surface	Average 180 deg centigrade test abandoned	Average 138 deg centigrade	Average 130 deg centigrade
Temperature covering felt on face towards panel	Average 165 deg centigrade –test abandoned	Average 110 deg centigrade	Average 90 deg centigrade

** There is thus significant reduction in temperature measured on cloth when it is covered on panel with 15 and 20 mm protrusion.

For any panel depending on wattage for unit area, level of safety increases with increased gap up to certain measure after which the improvement benefit may not be significant.

By using described panels of this invention safety can be greatly enhanced against fire hazard, when the surface is covered for any reason where no temperature limit or cut off control is used and also where such device fails.

We Claim:

1. A panel heater with enhanced safety means adaptable as room heaters disposable on walls, or floor, comprising:
 - A flat panel heater (B) comprising filled oil using electrical energy alternatively a heating panel where heated wire is covered with Electrical insulating material is accommodated inside a flat covering panels which is supplied with electrical energy from conventional source and is mounted on wall or floor mounting-
 - When provided with at least one protrusion on top of the panel or alternatively one at the top and other at bottom so that when covered by a cloth or felt creates air gap and reduces the temperatures attained on panel surface and the covered cloth significantly, thereby enhancing safety levels to prevent fire hazard.
- 2) The panel heater as claimed in claim 1, wherein the thickness of the protrusion of member (E) is selected between 6 to 25mm measured over surface of the panel.
- 3) The panel heater as claimed in claim 1, wherein the thickness of the protrusion member (E) is selected corresponding to expected temperature rise on the surface of the panel (B).
- 4) The panel heater as claimed in any of the preceding claims, wherein the protrusion member (E) is configured integrated to the panel cover either during manufacture or subsequently before usage.

- 5) The panel heater as claimed in any of the preceding claims wherein, the protrusion member (E) is configured as an independent member being undetachably attached to the panel cover.
- 6) The panel heater as claimed in claim 1, wherein the shape of the protrusion member (E) is selected from a group of rectangular, square, circular, trapezoidal either continuous or discontinuous.
- 7) A panel heater with enhanced safety means adaptable as room heaters disposable on walls, or floor as subsequently described and illustrated herein with reference to the accompanying drawings.

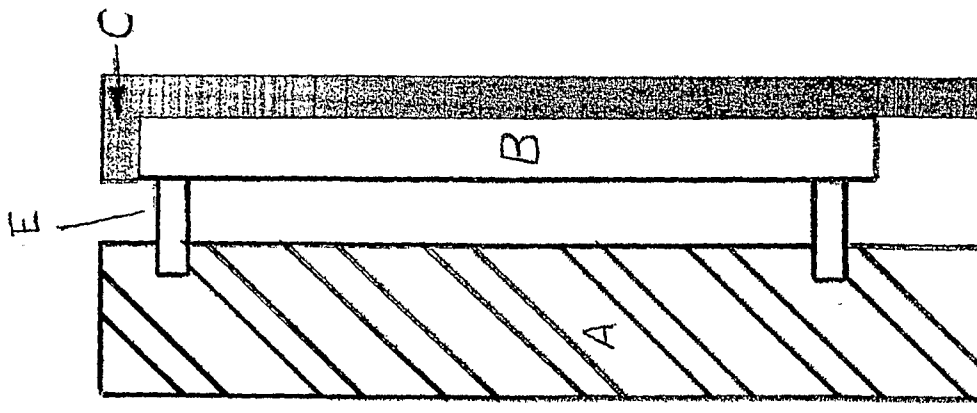


Fig. 1(a)

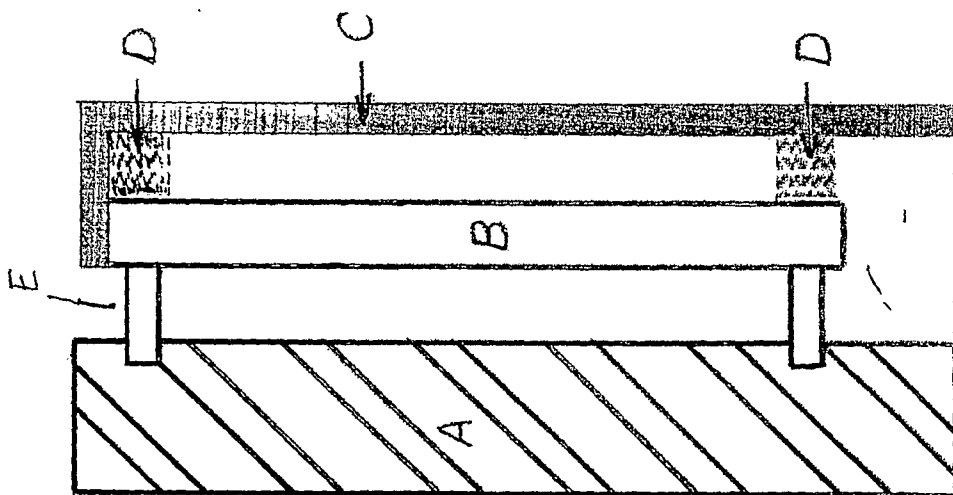


Fig. 1(b)

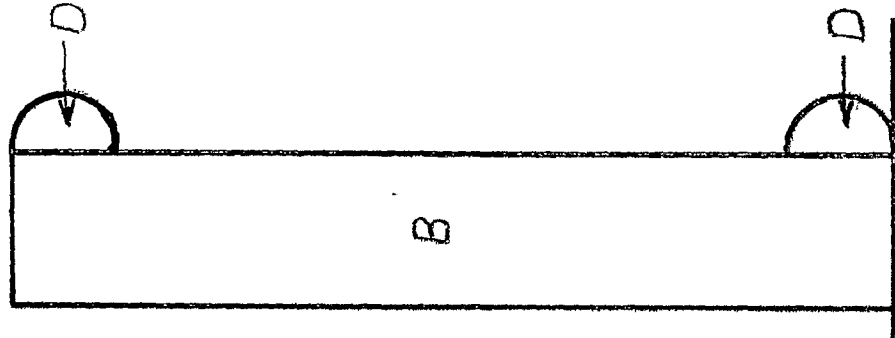


Fig. 1(c)

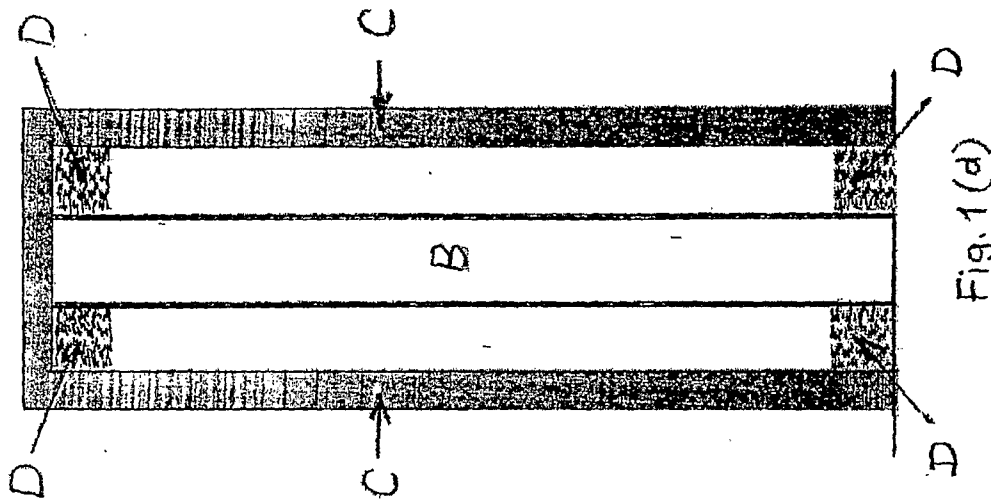


Fig. 1(d)