United States Patent [19]

Brasky

[11] **3,751,630**

[45] **Aug. 7, 1973**

[54] **RADIANT PANEL HEATING SYSTEM**

[75] Inventor: **Joseph L. Brasky**, Killingworth, Conn.

[73] Assignee: **Therma-Ray, Inc.**, Killingworth, Conn.

[22] Filed: **Oct. 12, 1971**

[21] Appl. No.: **188,388**

[52] **U.S. Cl.** ..... **219/345**, 174/50, 174/71 R, 174/84 C, 219/213, 219/356, 219/541

[51] **Int. Cl.** **H05b 1/00**, H02g 3/00

[58] **Field of Search** ..... 219/345, 213, 356, 219/541; 174/84 C, 50, 71 R, 94 R; 339/276 R, 276 T

[56] **References Cited**

UNITED STATES PATENTS

3,400,247	9/1968	Deacon	219/345
3,065,292	11/1962	Chickvary	174/84 C
3,265,858	8/1966	MacGuire	219/345
1,032,249	7/1912	Snow	174/50
2,876,326	3/1959	Akmentin	219/213
419,365	1/1890	Seely	174/71 R
3,223,775	12/1965	Nugent	219/345 UX
3,095,491	6/1963	Deacon	219/213 X
2,296,443	9/1942	Kleinfelder	174/71 R
3,496,284	2/1970	Astrove	174/72 R
2,932,711	4/1960	Adams	219/345

FOREIGN PATENTS OR APPLICATIONS

983,743	2/1951	France	174/84.1

Primary Examiner—A. Bartis

Attorney—Anthony P. De Lio, Robert H. Montgomery et al.

[57] **ABSTRACT**

An electric radiant heating panel includes a gypsum panel incorporating a length of electrical resistance heating wire therein having ends adapted to be connected to source leads at the rear surface of the panel by connection members. Each connection member comprises a short length of wire attached at one end to the heating wire and carrying a sleeve-like member on the other end adapted to receive source leads from two directions whereby a plurality of such panels can be connected electrically in parallel with the source leads. A cover is provided over the connection members at the rear of the panel and comprises a section of gypsum panel scored through one cover sheet and the gypsum core so that the section is divided into two portions whereby the other cover sheet acts as a hinge. One portion is secured to the rear surface of the panel, while the other portion is recessed to receive the connection members and source leads and is pivotally movable about the hinge relative to the rear surface of the panel to selectively cover or expose the source leads and connection members.

3 Claims, 6 Drawing Figures

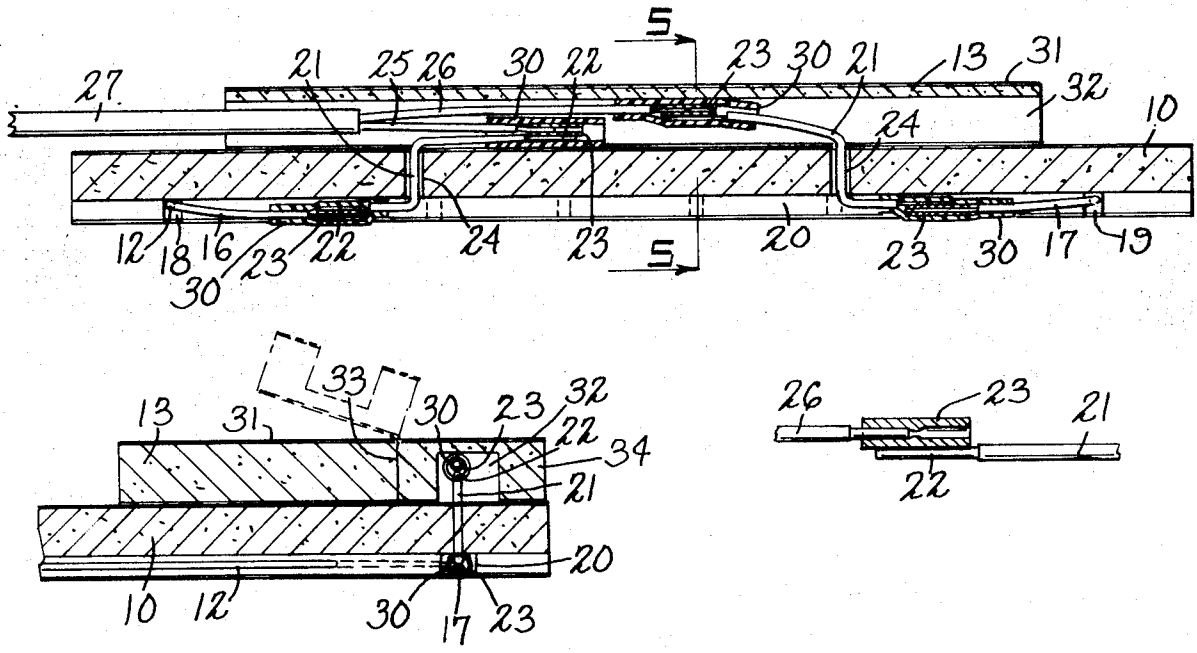


Fig. 1.

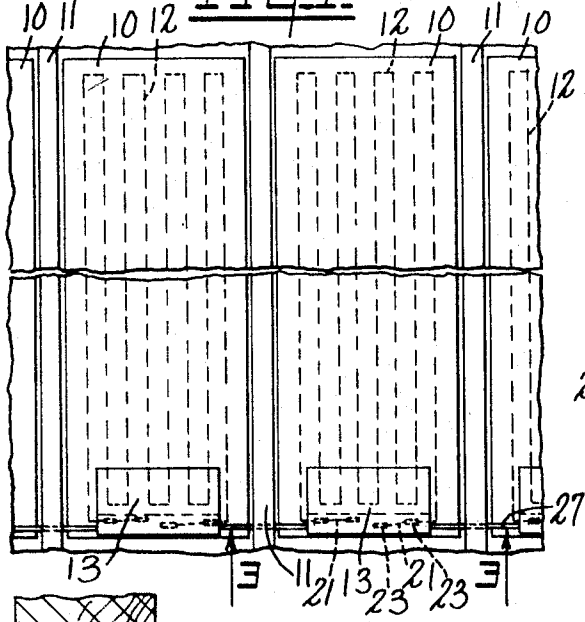


Fig. 2.

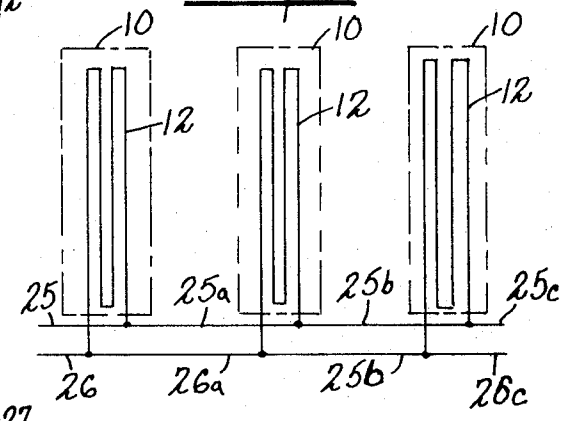


Fig. 3.

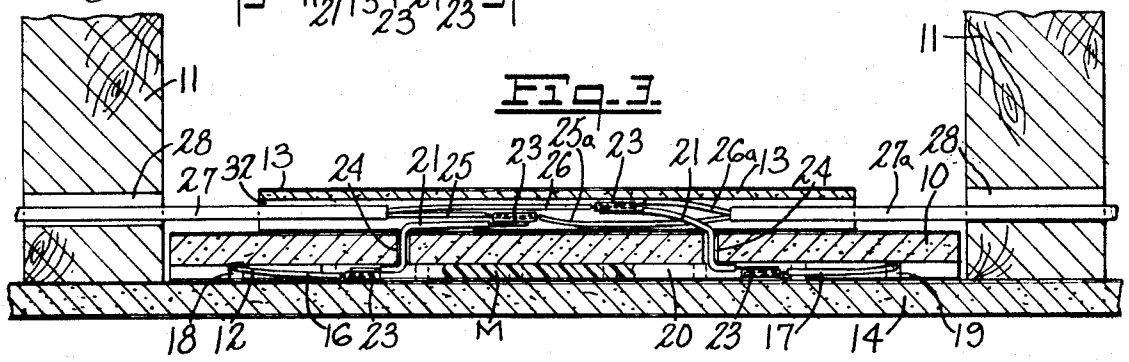


Fig. 4.

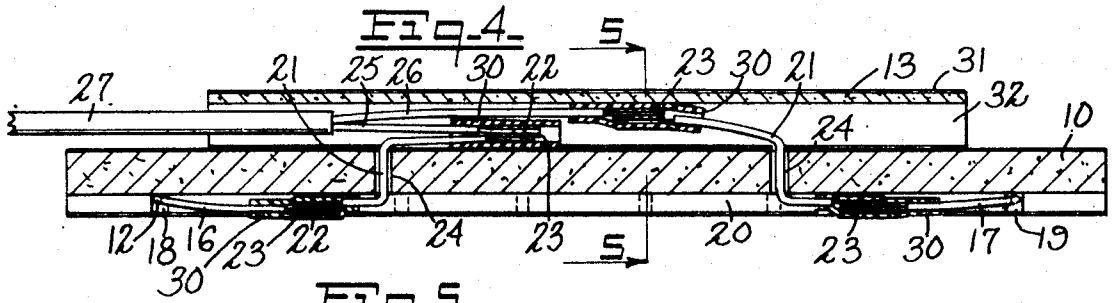


Fig. 5.

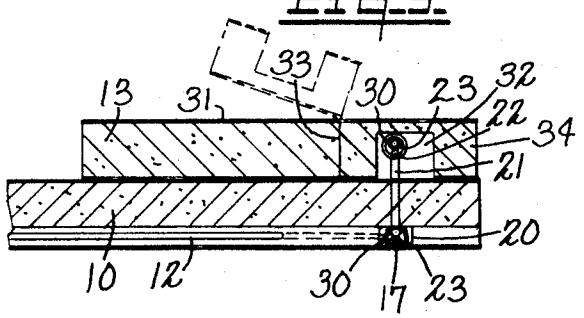
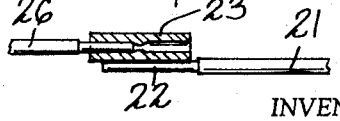


Fig. 6.



INVENTOR

Joseph L. Brasky

BY Dedio and Montgomery

ATTORNEYS

RADIANT PANEL HEATING SYSTEM

This invention relates to electric heating panels and more particularly relates to improvements in connecting such panels to a source of electrical energy.

Electric heating panels are used in many instances to provide radiant heat from the ceiling of an area. Such panels are generally dimensioned to fit between the ceiling rafters or joists and may be of varying length. The panels generally have embedded therein a heating wire such as Nichrome of predetermined resistance per foot and the wattage of each panel is determined by the resistance value per foot of the resistance wire and the total length thereof. The resistance heating wires of each panel are connected in parallel to a source of energy and thermostats may be positioned to regulate the off-on time of the application of electrical energy to the heating wires.

In the past, the AC line, hereinafter referred to as the source leads, are run from each panel to a central connection point and then connected to the main power source. This type of connection is time consuming to make and requires a large amount of source leads associated with each panel.

Accordingly, the present invention is intended to eliminate the necessity for running a source lead to each panel from a junction point, and to facilitate electrical connections between the panels on a given circuit.

This is achieved in one form of the invention by providing a connector for joining the resistance wire to the source lead so that source leads between panels may be easily and quickly connected. In one form, the connector is a strip of wire having joined to one conductive end thereof a sleeve-like connector or terminal in good electrical contact therewith which is adapted to receive source leads from both directions and quickly make electrical connection thereto.

An object of this invention is to provide a new and improved electrical connecting system for electric heating panels.

Another object of this invention is to provide a new and improved connector for running short lengths of source leads between the heating panels which source leads may be incorporated in the heating panel.

The features of the invention which are believed to be novel are distinctly claimed and particularly pointed out in the concluding portion of this specification. The invention, however, may best be appreciated by reference to the following detailed description taken in conjunction with the drawings, wherein:

FIG. 1 is a view of a plurality of heating panels disposed between rafters as seen from above;

FIG. 2 schematically illustrates the connections of the heating panels to source leads;

FIG. 3 is a section seen in the plane of lines 3—3 of FIG. 1;

FIG. 4 is an enlarged view of a portion of FIG. 3;

FIG. 5 is a sectional view seen in the plane of lines 5—5 of FIG. 4; and

FIG. 6 is a view of a portion of a connector utilized in the heating system disclosed in FIGS. 1 – 5.

FIG. 1 shows a plurality of heating panels 10 disposed between parallel rafters or joists 11 in a structural system. The panels are dimensioned in width to substantially the standard spacing between the joists 11. Each of the panels includes a resistance heating wire 12, pattern or grid, preferably of Nichrome, therein. At one end of each panel is a cover member 13 whose function and structure is hereinafter described. Disposed under cover 13 are connections between the source leads and the heating wire as will hereinafter be more fully described.

FIG. 2 exemplifies the electrical connection of the wires 12 of panels 10 in parallel to source leads and extensions thereof between each of the panels 10.

The panels 10, in practice, are generally suspended on nylon straps (not shown) which are tacked across the length of the joists or rafters to hold the heating panels therebetween. On completion of the installation of the heating panels 10, a normal finish ceiling 14 which may be sheet rock, plaster or any spcified finish is applied to and supported from joists 11 by mechanical fasteners, adhesives, etc.

The heating panel may be made by casting the heating wire into the gypsum as a gypsum panel is formed and then the usual cardboard and paper covering supplied to the exterior surfaces. Alternatively, a finished gypsum board may be grooved or recessed in the pattern of the grid wire, the heating wire placed in such grooves or recesses and then covered with a gypsum grout.

The ends 16 and 17 of the heating wires 12 extend out of grooves 18 and 19, respectively, of the panel preferably into a laterally directed recess or groove 20 which may extend all or part way across the panel. After the connections hereinafter described are made, the recess may be filled with an insulating material M.

To connect the heating wires to the source leads, connectors 21 are provided. The connector 21 in one form comprises a length of insulated wire having stripped ends 22, and having attached thereto a double-ended sleeve type connector 23, FIG. 6. The sleeve-type connector may be placed on either one end or both ends of the connector 21 as hereinafter described. The connectors 21 extend from the recess or groove 20 through the panel 10 via apertures 24.

The source leads 25 and 26 which may be the normal plastic coated cable 27 of predetermined gauge extend from panel to panel, preferably through holes 28 drilled in the joints or rafters 11. Alternatively, the cable containing the source lead lines 25 and 26 may be connected between panels and crossed over the top of the joints or rafters. The source leads may be formed in sections 25*a* – 25*c* and 26*a* – 26*c*.

As shown in FIG. 3, a first cable 27 containing the source leads 25 and 26 extends from the left, and lead 25 is received in the sleeve 23 carried on one end of a first connector 21. Lead 26 extends to the sleeve 23 on the second connector 21 through one end thereof. Another cable 27*a* having leads 25*a* and 26*a* extends to the panel from the right and the leads 25*a* and 26*a* are received at the opposite ends of the sleeves 23. The sleeves may then be crimped and a fast mechanical connection is made thereto.

With is construction, it will be seen that each panel 10 may be produced with a pair of connectors 21 together with a length of cable 27. Then when the panels are positioned between the joists or rafters, each section of the source lead may be readily connected to the adjoining panel to place the electric circuit of each panel quickly in parallel with the source leads. This substantially decreases the amount of time required to make the electrical connections from panel to panel,

and further substantially decreases the total footage of lead line previously required.

It is preferred to place over the connections a section of heat shrinkable insulating tubing **30.** Then after the mechanical connections are made, the sections of tubing **30** are slid over the connectors and shrunk thereon.

In accordance with another aspect of the invention there is provided a means for completely embedding the connections external to the panel **10** in an insulating material. The cover member **13** may comprise a small section of gypsum board having the usual cardboard backing **31** (FIG. **5**). A section of the member **13** is then recessed or grooved indicated by reference numeral **32.** A cut and break is made in the gypsum panel at **33** without disrupting the backing **31.** Then the section **34** may be pivoted upwardly as if it were hinged. When all the connections are made the recess **32** may be filled with a gypsum grout or other suitable insulating and adhesive material and the portion **34** moved down to the position shown in full line in FIG. **5** to give essentially a complete encapsulation of the connections to the source leads.

It will be appreciated that it is not necessary to place the sleeve **23** on both ends of the connectors **21** inasmuch as the connector at one end thereof receives only a single lead from the heating wire. In its place a normal crimp type sleeve connector may be used. However, for versatility and so that the installer will not have to be concerned about positioning of the connectors, the sleeve **23** may be placed on both ends of the connector **21.**

It may thus be seen that the objects of the invention set forth as well as those made apparent from the foregoing description are efficiently attained. While preferred embodiments of the invention have been set forth for purposes of disclosure, modification to the disclosed embodiments of the invention as well as other embodiments thereof may occur to those skilled in the art. Accordingly, the appended claims are intended to cover all embodiments of the invention and modifications to the disclosed embodiments which do not depart from the spirit and scope of the invention.

What is claimed is:

1. An electrical heating panel carrying a length of electrical resistance heating wire therein having ends adapted to be connected to source leads, a pair of connection members each having one end connected to a respective end of said heating wire and the other end adapted to be connected to source leads at a rear surface of said panel, a cover for the connection of said connection members to said source leads at a rear surface of said panel, comprising, a section of panel having a layer of gypsum between two flexible cover sheets, said section being scored through one sheet and said layer so that said other sheet acts as a hinge and said section is defined in two portions, one of said portions secured to the rear surface of the panel, a recess defined in the other portion, said one of said portions being positioned on said panel such that said other portion may be pivoted to contact the rear surface and receive the connections of the connectors to the source leads in said recess.

2. The apparatus of claim **1** wherein the connection members connect source leads between two other adjacent panels and the heating wires of each panel are in parallel with the source leads.

3. The apparatus of claim **1** wherein said connection members each comprise a length of conductor having one end connected to the heating wire and carrying a sleeve-like member on the other end thereof adapted to receive source leads from two directions.

* * * * *