Oct. 7, 1952 C. FRERE 2,613,309

CONTACTING DEVICE FOR ELECTRIC HEATING PANELS

Filed Nov. 15, 1950

Fig. 1.

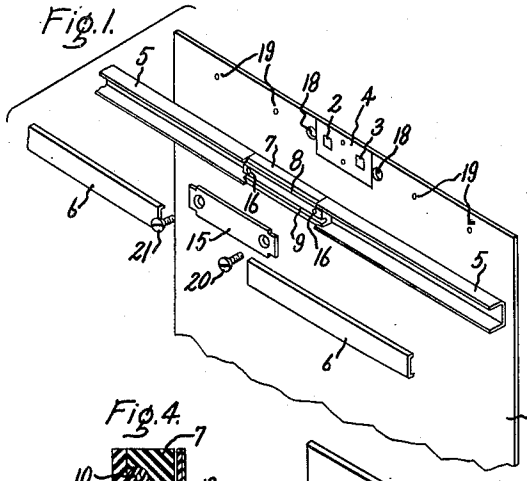


Fig. 2.



Fig. 3.

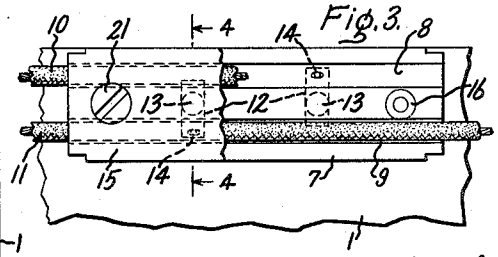


Fig. 4.

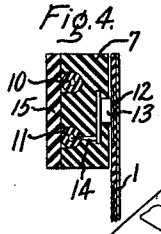


Fig. 7.

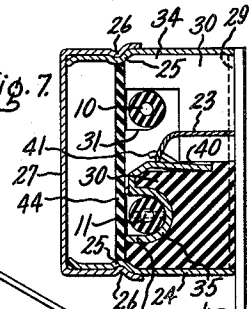
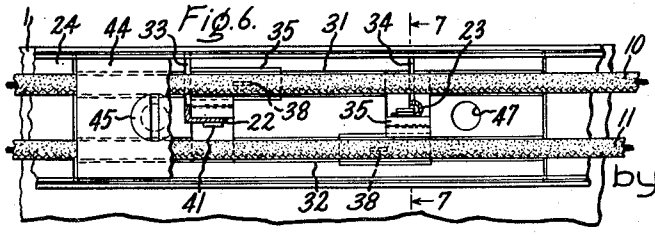


Fig. 5.

Fig. 6.



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CONTACTING DEVICE FOR ELECTRIC HEATING PANELS

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4 Claims. (Cl. 219—19)

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This invention relates to electrical heating panel installations, and more particularly to a power supply arrangement therefor.

Electric heating panels for radiant heating of an enclosure conveniently take the form of thin panels comprising an electrical resistance element embedded between outer insulating and protective layers. Since such electrical heating relies on providing large areas heated to a relatively low temperature, each panel presents considerable surface. For example, in practice I find that a panel 17 to 18 inches wide by 70 inches long is a convenient size. This size of panel provides flexibility so that a series of such panels may be used on walls, ceiling, or floor of either a large or small enclosure. Obviously, however, each installation normally will require a plurality of such panels.

An object of my invention is to provide an arrangement for supplying electrical energy to each of a plurality of panels in an installation.

A further object of my invention is to provide such a power supply arrangement in the form of a decorative molding adapted to be run along the edge of one or a series of panels, preferably in the corner between two adjacent surfaces of an enclosure.

Another object of my invention is to construct such a power supply arrangement which can be installed in an electric heating panel installation without appreciable modification of the structure of an existing building or other enclosure.

Still another object of my invention is to construct a power supply system for an electric heating panel installation which reduces to a minimum the labor involved in connecting each panel to a source of electrical energy.

In accomplishment of the foregoing objectives in connection with one or more electric heating panels having surface terminals for the resistance element, a feature of my invention consists in enclosing the power supply conductors in a hollow molding provided with a removable interfitting cover. At spaced points along the molding, a terminal block is provided which interfits with the molding. A further feature of the invention consists in the construction of this terminal block with a conductor member for each of the heating panel terminals, with each conductor member including an insulation piercing pin positioned within a channel. The power supply conductors extending through the molding are positioned in respective ones of the channels and forced on to the insulation piercing pins by a pressure plate.

My invention will be better understood from the following description taken in connection with the accompanying drawings, and its scope will be pointed out in the appended claims.

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Referring to the drawing, Fig. 1 is an exploded perspective view of a portion of a heating panel with a power supply arrangement in accordance with one embodiment of my invention; Fig. 2 is a top plan view of a portion of the embodiment illustrated by Fig. 1, with the components in assembled relation; Fig. 3 is a front elevation of the embodiment illustrated by Fig. 1, with a portion of the device broken away; Fig. 4 is a cross-sectional view taken on the line 4—4 of Fig. 3; Fig. 5 is an exploded perspective view of an alternate embodiment of my invention; Fig. 6 is a front elevation of the embodiment illustrated by Fig. 5, with the components in assembled relation and a portion broken away to illustrate details; and Fig. 7 is a cross-sectional view taken on the line 7—7 of Fig. 6.

This invention is particularly adapted for use with electric heating panels constructed in accordance with patent application Serial #78,738, filed February 28, 1949, by Felix S. Waltersdorf, Robert W. Scott, and Frank T. Grothouse and assigned to the assignee of the present invention. Briefly described, this heating panel consists of a resistance element embedded between sheets of plastic coated insulation with outer protective layers of metal or other suitable grounding and surfacing material. Referring to the drawing, such a heating panel is shown at 1. Terminals for the resistance element within the panel are provided along one edge. As shown in Fig. 1 the terminals 2 and 3, mounted in spaced relation in a dielectric sheet 4, are substantially flush with the front surface of the body of the panel. The details of this terminal construction are presented and claimed in the above mentioned application of Waltersdorf et al.

For radiant heating of an enclosure by such electric heating panels, a plurality of panels normally will be mounted on one or more of the enclosing surfaces of a room. It is necessary, of course, to run power supply conductors from panel to panel throughout the installation. To carry these conductors, as shown in Fig. 1, I employ a channel-shaped molding 5 provided with a cover 6. At spaced points, corresponding to the location of the surface terminals of each panel, I provide a connection block 7 interfitting and in alignment with adjacent sections of the molding. While in Fig. 1 I have shown cover 6 in separate sections on either end of the connection block, obviously the cover could be a continuous length extending over and enclosing the block.

As shown more clearly in Figs. 2, 3, and 4, the connection block is made from suitable insulating material, for example by molding a phenolic condensation product. The front surface of this block is formed with a pair of channels 8

and 9 to receive power supply conductors 10 and 11 extending through molding 5. Positioned within each channel is an electrical conducting member 12, which comprises a surface contact portion 13, for engaging one of the surface contacts on the panel body, and an insulation piercing pin member 14 projecting outwardly within the channel. This construction is illustrated clearly by Fig. 4, showing conductor 11 positioned within the lower channel 9 of the connecting block. The conducting member 12 makes contact, by way of its surface contact portion 13, with the surface terminal 2 on the panel. At the same time, when conductor 11 is forced into the channel by a pressure plate 15, the insulation piercing pin establishes contact between conductor 11 and one of the terminals of the resistor within the heating panel. Similarly, power is supplied from conductor 10 to the surface terminal 3 on the panel.

In addition to the electrically conducting members 12, I prefer to mold in position within each connecting block and adjacent each end thereof an internally threaded thimble 16. These thimbles are placed between channels 8 and 9 as shown in Fig. 1. Preferably, each thimble includes a rearwardly extending portion 17 to engage apertures 18 on the heating panel. This construction aids materially in accurately positioning each terminal block with respect to the surface contacts 2 and 3.

With the construction shown by Figs. 1 through 4, the installation may be accomplished by positioning terminal block 7 over the panel terminals as described above. Sections of molding 5 are then engaged with the ends of each terminal block and attached to the panels by any suitable fastening means extending through the base of the molding and through apertures such as 19 in the panel. Thus, attachment of molding 5 to the panel may at the same time serve as a means for affixing the panel to a wall or enclosing surface of a room. Furthermore, by grounding molding 5, the surfaces of all panels in the installation may be automatically grounded. The power supply conductors may now be placed within the molding and within respective channels in the connector block. The pressure plate 15 is positioned over the connector block and forced into position by screws 20 and 21 threaded into thimbles 16. This operation simultaneously causes the pin portion 14 of each conductor member 12 to pierce the insulation of its associated power supply conductor to establish a connection with the panel terminals. When the molding covers 6 have been placed in position, the installation is complete and ready for operation. Thus, it is seen that installation is greatly facilitated with this construction, and at the same time, the power supply connections may be readily serviced in the future. Furthermore, this arrangement does not require any modification of existing surfaces of an enclosure. Additionally, the power supply conductors are completely enclosed within a housing, which serves also as a decorative molding.

In Figs. 5, 6 and 7 of the drawing, I have shown an alternate embodiment of my invention for accomplishing the same purposes and objectives. As with the prior embodiment, the power supply arrangement is applied to an electric heating panel 1 or to a series of such panels. However, in this instance, the terminals for the heating element within the panel are brought out as lead wires 22 and 23. Such a construction of the panel may be preferable to avoid the expense of forming special surface contacts mounted in a dielectric plate in the panel. A molding 24 of a channel shape extends along an edge of the panel or of a plurality of such panels to carry power supply conductors 10 and 11, these conductors being insulated in the usual manner. The upstanding side walls of the molding are grooved as at 25 for cooperative engagement with beads 26 on a molding cover 27.

To receive terminal blocks, the base portion 28 of molding 24 may be cut out at spaced points as at 29; the spacing of such cutouts corresponding with the position of the panel terminals. The terminal block 30 in this embodiment likewise is formed from a suitable insulating compound, such as a molded insulating plastic. As with the previous embodiment, each terminal block is provided with channels such as 31 and 32 to receive the power supply conductors 10 and 11. While I have shown two such channels in the illustrated embodiment to receive the two conductors 10 and 11, it is to be understood that this arrangement is adapted for use with one or more power supply conductors. Each terminal block includes transverse cuts 33 and 34 spaced apart to receive the panel terminal leads 22 and 23. These cuts extend inwardly from the upper edge of the terminal block to approximately the longitudinal center line of the block. As will appear later, this construction materially facilitates the electrical connection from power supply conductors 10 and 11 to panel terminals 22 and 23.

As shown most clearly in Figs. 5 and 7, an electrical conducting member 35 is provided to facilitate the electrical connection between a power supply conductor and a panel terminal. Member 35, fabricated from a material such as copper, includes an outer rolled portion 36 with its external surface conforming substantially to the contour of the semi-circular conductor receiving channel in the terminal block. To avoid the presence of any sharp edges which might damage the insulation on the power supply conductors, I find it preferable to recess the conductor channels in the terminal block as at 37. Lanced from an intermediate portion of conductor member 35 is a pointed projection or pin 38 adapted to pierce the insulation on a power supply conductor, thereby making electrical engagement with the conductor itself. In addition, the conductor member is provided with a depending portion 39 receivable in a recess 40 in the insulating block. The depending portion 39 of the conductor includes a projecting ear 41 around which a panel conductor may be placed as shown in Fig. 7, providing a quick connection.

Assembly of this arrangement may be performed as follows. Molding 24 is first attached to the panel through suitable mounting apertures such as 42, which operation may also be used for attaching the panel to a surface. During this operation, the opening in base 28 of the molding is placed over the terminal wires 22 and 23. At this stage of the assembly, terminal block 30 may be positioned within the opening in the molding, at which time terminal wires 22 and 23 are placed within slots 33 and 34 of the block. Each terminal wire is then given a turn around the projecting ear 41 of its respective conductor member 35 to establish electrical connection to the conductor member. Preferably, this conductor member has a slightly larger exterior dimension than the prepared recess within the insulating block so

that when the conductor member is forced into position, its resiliency tends to hold the member in position in the block **31**. At this point, it may be noted that the insulation piercing pin **38** of one of the conductor members lies in the upper channel **31**, while the corresponding portion of the other conducting member lies in the lower channel **32** of the insulating block.

Conductors **10** and **11** are laid in the respective channels or grooves **31** and **32**, after which a pressure plate **44**, likewise of insulating material, is placed over the conductor block and forced into position by the use of suitable fastening means, such as screw **45**, extending through an aperture **46** in the pressure plate and making threaded engagement with a tapped recess **47** in the terminal block. This operation forces the conductors against the insulation piercing pins, thereby establishing connection between each conductor and its corresponding conducting member **35**. The operation is completed by assembly of molding cover **27** in position on molding base **24**. Preferably cover **27** extends over the terminal block assembly as well as covering the remainder of the channeled molding.

Again it may be seen, that with this construction, as with the previously described embodiment, the electrical connections are established between power supply conductors and terminals of the resistance element within the panel with the minimum of difficulty and by use of a construction appearing merely as a molding along the edge of the panel, preferably in a corner of a room. No soldered connections are involved, nor does the construction require the use of any lugs with threaded fastening devices.

While the present invention has been described by reference to particular embodiments thereof, it will be understood that numerous modifications may be made by those skilled in the art without actually departing from the invention. I, therefore, aim in the appended claims to cover all such equivalent variations as come within the true spirit and scope of the foregoing disclosure.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an electric heating panel installation including one or more panels mounted on an interior surface of a room, each of said panels having terminals for its heating element on its front face along an edge thereof, means supplying power to a plurality of panels comprising a hollow molding attached to aligned panels over and in alignment with said terminals, a removable cover for said molding, power supply conductors positioned in said molding, and a terminal block interfitting with said molding, said terminal block including conductor means electrically connected to the terminals of the panel, an insulation piercing pin integral with each of said conductor means, a channel in said terminal block for receiving each power supply conductor, each of said pins being positioned in a respective one of said channels, and means forcing the power supply conductors against said pins.

2. In an electric heating panel installation including one or more panels mounted on an interior surface of an enclosed space, each of said panels having terminals for its heating element on its front face along an edge thereof, means supplying power to said panels comprising a channel-shaped molding attached to said panels over and in alignment with said terminals, a removable cover for said molding, power supply conductors positioned in said molding, and a terminal block interfitting with said molding and including conductor means connecting respectively with each of the terminals of the panel, an insulation piercing pin integral with each of said conductor means, a channel in the terminal block for receiving each of the power supply conductors, said pins being positioned in respective ones of said channels, and means forcing the power supply conductors against said pins.

3. In an electric heating panel installation having one or more panels mounted on an interior surface of an enclosed space with each panel having for its heating element terminals on its outer face adjacent one edge thereof, means supplying power to one or more of said panels comprising a channel-shaped molding attached to said panels adjacent said one edge and over said terminals, a removable cover for said molding, power supply conductors in the molding, and a terminal block interfitting with said molding, said block comprising a longitudinally extending channel for each power supply conductor, and an electrical conducting member for each channel having an insulating piercing pin projecting outwardly within the channel and a contact portion on the opposite side of said block from said pin which engages a surface contact of the panel.

4. In an electric heating panel installation including one or more panels mounted on an interior surface of a room with each panel having terminal wires for its heating element extending outside the front face of the panel adjacent one edge thereof, means interconnecting said terminal wires to a power supply source comprising a channel-shaped molding attached to the panel adjacent said one edge, said molding being provided with a cutout portion to receive the terminal wires, a terminal block of insulating material positioned within said cutout opening, said terminal block having longitudinally extending grooves to receive respective power supply conductors, a pressure plate adapted to force the conductors into said grooves, a cover enclosing said molding and terminal block, and an electrical conducting member for each of said power supply conductors for establishing electrical connection between the conductors and the panel terminal wires, said electrical conducting means comprising a portion formed to conform to the shape of said groove, an insulation piercing pin in said portion, and a projecting ear making an acute angle with respect to said electrical conducting member over which the panel terminal wire is engaged.

CLARENCE FRERE.

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