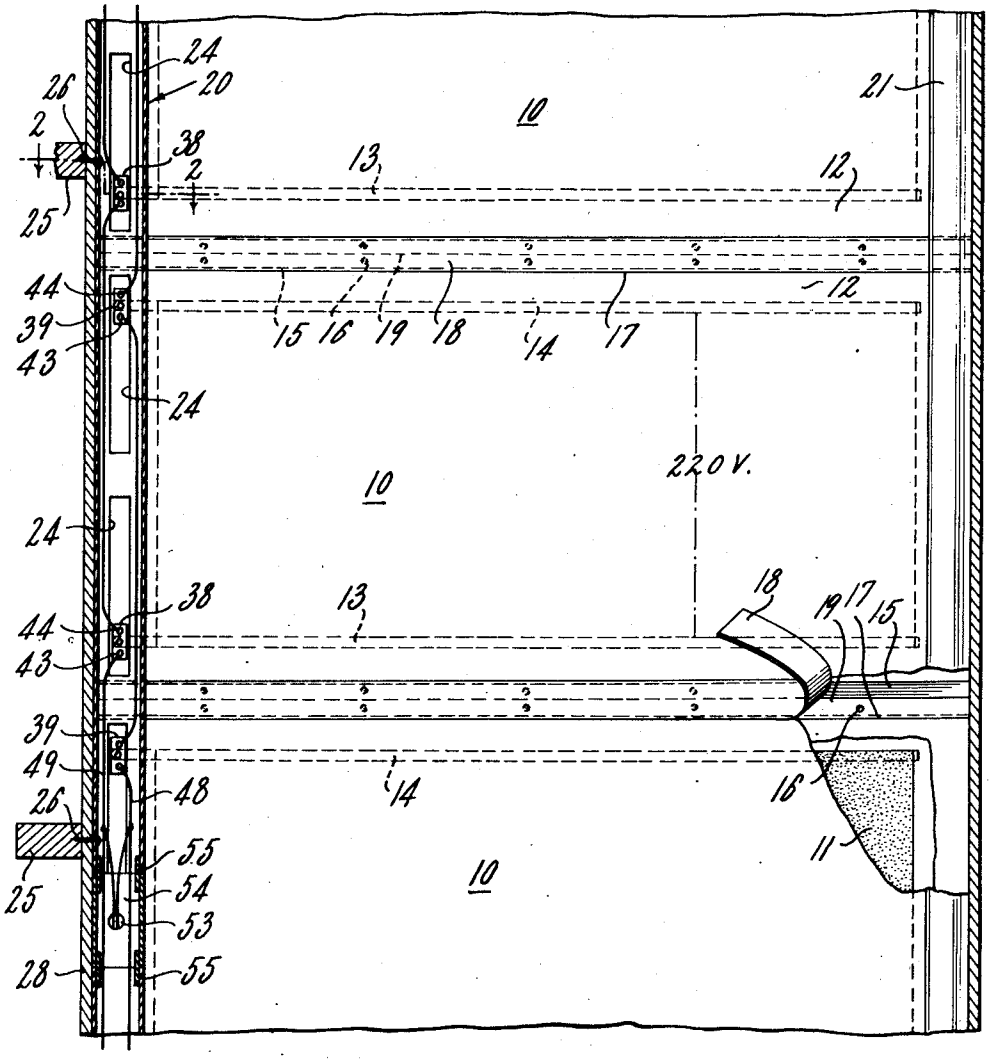
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RADIANT HEATING INSTALLATION

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Fig. 1



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Fig. 2

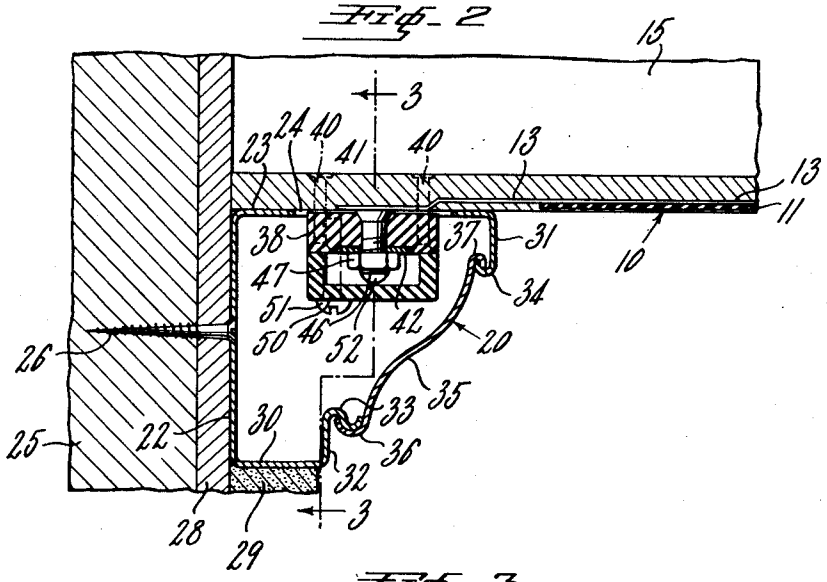


Fig. 3

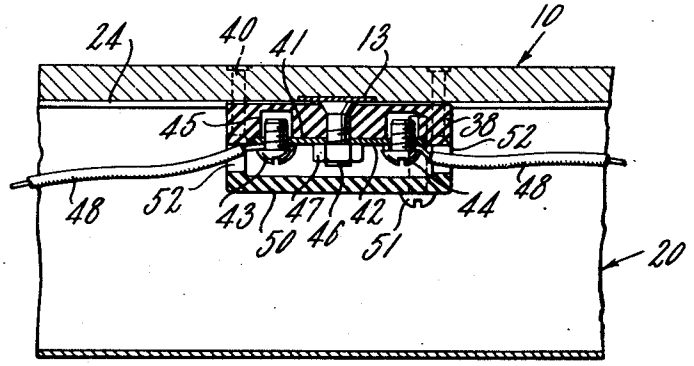
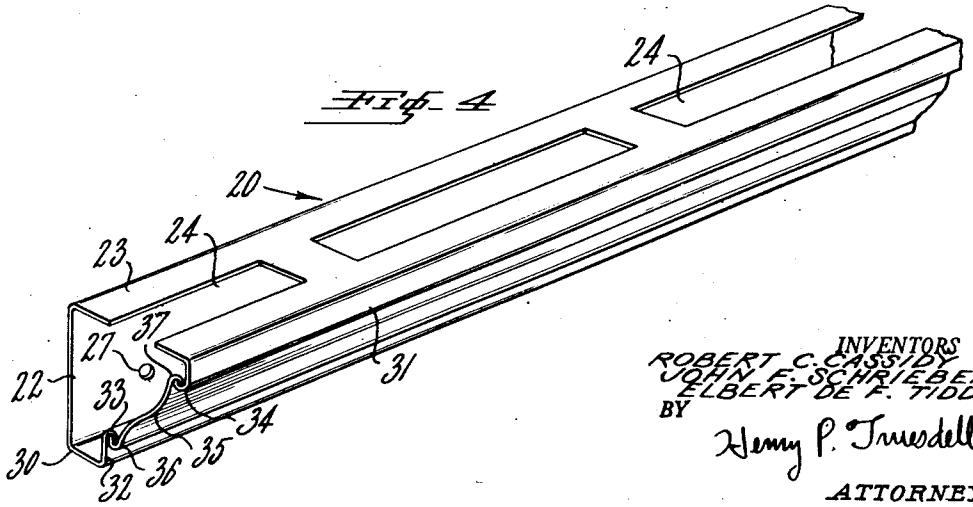


Fig. 4



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RADIANT HEATING INSTALLATION

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9 Claims. (Cl. 219—19)

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This invention relates to radiant space heating installations, and more particularly it relates to electrical radiant heating systems which are incorporated in the ceiling or walls of a room. This application is closely related to the Tidd et al. application Serial No. 134,949 filed December 24, 1949 for Radiant Heating Installation and covering the invention more broadly than herein. It is also closely related to the Barnes et al. application Serial No. 118,966 filed September 30, 1949 for Metal Raceway, and covering a raceway per se.

It is a principal object of the invention to provide an improved means for assembling electrical radiant heating panels in the ceiling or wall of a room which permits latitude in the placement of such panels and which provides a decorative enclosure or support for such panels.

Another object is the provision of an electrical radiant heating panel installation in which the electrical connections to the panels are protected within an enclosure constructed to allow for adjustable positioning of such enclosure with respect to the panels.

Still another object is to provide an improved enclosure for electrical heating panel connections and wiring, which can be associated with such panels conveniently, which permits easy access to such wiring, and which facilitates subsequent finishing of the surfaces of the room in which it is installed.

Additional objects and advantages of the invention will be made evident in the following detailed description when read with reference to the accompanying drawings, wherein:

Fig. 1 is a plan view, with parts in section, of part of the ceiling of a room (viewed from below) formed of heating panels assembled with a cove raceway in accordance with the present invention;

Fig. 2 is a fragmentary sectional elevation on a larger scale of a cove of the room taken along line 2—2 of Fig. 1 and showing details of attachment of electrical wiring to the heating panels;

Fig. 3 is a fragmentary sectional view through a connector block taken along the line 3—3 of Fig. 2; and

Fig. 4 is a perspective view of the cove raceway of Fig. 2 in which electrical connections to the heating panels are made.

Referring to Fig. 1 of the drawings, the room ceiling represented therein comprises a row of electrical radiant heating panels 10, arranged adjacently and extending from either side of the room so as to cover a major part of the

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ceiling and display an unobtrusive, flush appearance. These panels may be of the general character disclosed in the U. S. Patent 2,314,766 to A. W. Bull et al., and include a film or layer of electrically conducting composition, such as a dispersion of conductive carbon black in a rubber composition, embedded in an electrically insulating material, such as a composition building board. The panel itself forms no part of the instant invention and is of a type now available on the market.

Each panel 10 contains such an electrical heating element comprising a layer or film of electrically conductive rubber 11 embedded in the interior of a composition building board and spaced from the marginal edge thereof to leave non-conducting marginal areas 12 at the ends and sides of the panel through which nails or screws may be driven without fear of shorting or grounding the electrical circuit. Embedded feed tapes 13 and 14 of conductive material, such as copper or aluminum tapes, engage the longitudinal edges of the conductive layer 11 in electrical contact therewith for passing electric current therethrough.

The panels 10 are fastened to ceiling beams 15 running transversely of the room, as by means of spaced nails or screws 16 passing through the non-conductive marginal areas 12 of the panel into the beams. In order that the panels may present a perfectly smooth, flush appearance suited for the application of plaster, paint, wall paper, cloth, or other desired decoration, the marginal edges of the panels through which the screws 12 are passed are provided with a slight recess 17, and a thin finishing strip 18 of paper, cloth, cement, or other suitable material is applied to the recess 17, as indicated most clearly in the broken away portion of Fig. 1, thereby covering neatly the joint 19 between adjacent panels as well as the heads of the screws 16.

For the purpose of associating electrical feed lines with the panels 10 there is provided along at least one edge of the row of panels a raceway, such as an angular metal channel 20, suitably made in the decorative form of a cove molding as shown in perspective in Fig. 4. The remaining edges of the panels are similarly covered with a cove molding 21 of similar external appearance, which however need not necessarily be a raceway capable of accommodating electrical connections.

The angular raceway 20, as shown in perspective in Fig. 4, has a back wall 22 adapted to rest against the side wall of the room and a top wall 23 adapted to rest against the ceiling. The race-

way is adapted to fit in the corner of the room under a marginal edge of the panel 10 at the junction of the wall and ceiling of the room, as indicated most clearly in Fig. 2. The top wall 23 of the raceway contains elongated spaced openings 24 (Fig. 4) which may be cut therein at the time of manufacture of the raceway, or which may be provided for in the form of knockouts. As will appear hereafter, the purpose of the openings 24 is to provide for an electrical connection to the panel and they are of a length to provide for adjustment of the panel electrical connections longitudinally along the length of the raceway.

The raceway 20 may be fastened to studs 25 of the room wall by screws 26 (Figs. 1 and 2) passing through holes 27 (Fig. 4) in the back wall 22 of the raceway. As represented in Figs. 1 and 2, the studs 25 of the room may be covered with a wall board 28, or with conventional lathing and a layer of plaster 29.

A horizontal ledge 30 (Figs. 2 and 4) projects from the bottom of the rear wall 22 of the raceway 20, serving as a guide for application of the layer of plaster 29 to the wall of the room. A vertical ledge 31 (Figs. 2 and 4) depends from the front edge of the top wall 23 of the raceway 20, such ledge also serving as a guide for the application of a layer of plaster (not shown) or other covering to the ceiling, if such is desired.

Extending upwardly from the lower plaster ledge 30 of the raceway 20 is an extension or flange 32 terminating in a reversely curved lip 33 (Figs. 2 and 4). The lower margin of the vertical plaster ledge 31 of the raceway also has a curved lip 34. The two lips 33 and 34 serve to frictionally engage a cover plate 35 carrying curved lips 36 and 37 on its marginal edges which cooperate with lips 33 and 34 to hold the cover plate 35 in place when it is snapped on the raceway. This forms with the walls 22 and 23 of the raceway a complete enclosure for the electrical wiring and connection therein. The snap-on cover plate 35 may have any desired suitable ornamental shape.

Terminal blocks 38 and 39 (Fig. 1) are provided near two of the corners of the panel 10 for the purpose of making the necessary electrical connections to the feeding tapes 13 and 14 which supply current to the conductive heating layer 11 within the panel. The terminal blocks 38 and 39 are made of electrically insulating material and extend from the front surface of the panel 10 into the raceway 20 through the openings 24 provided in the top wall 23 of the raceway for this purpose. The openings 24 are made considerably elongated with respect to the terminal blocks, such openings preferably being at least several times longer than the terminal blocks. In this way, after the panels carrying the terminal blocks are attached to the ceiling, the fitting of sections of the raceway over the marginal edge of the panel is greatly facilitated, since such elongated openings permit considerable latitude in aligning the openings in the raceway with the terminal blocks.

Each terminal block is fastened to the panel 10 by means of two rivets 40 passing through diagonal corners of the blocks as indicated in Figs. 2 and 3. The outer face of each terminal block has a shallow recessed portion 41 accommodating a terminal strip of conductive material, such as a copper strip 42, through which connecting screws 43 and 44 are threaded for the purpose of fastening electrical wiring to the terminal strip. Recesses 45 in the terminal block permit passage of the screws. For the purpose of making electrical contact between the terminal strip 42 and the feeding tapes 13 and 14 embedded in the panel 10, an end length of each tape, such as tape 13, is brought to the surface of the panel under the terminal block and passes into engagement with the back face of the terminal block. The head of a small metal bolt 46 passing through a hole in the center of the block engages the strip 13, and serves to electrically connect it to the terminal strip 42, which is secured to the bolt 46 by means of a nut 47.

After the panels 10 are assembled in position in the ceiling as shown in Fig. 1 and the raceway 20 is applied to the cove, electrical connections may be made to the terminal block assemblies 38 and 39 extending through the openings 24 in the top of the raceway by means of insulated electrical wires 48 and 49 connected to terminal screws 43 and 44 on the terminal blocks. In this way the series of heating panels 10 is electrically connected in parallel across the feed line. Each terminal block is provided with a cover plate 50 (Figs. 2 and 3) secured thereto by means of a screw 51 for the purpose of enclosing the electrical connections. Holes 52 in the sides of the cover permit passage of the supply wires to the terminal screws. The cover plates 50 are shown removed in Fig. 1 to reveal the electrical connections.

In operation, electric current fed to the terminal block 38 by the wire 48 passes through the connecting strip 42 in the face of the block and thence through the bolt 46 into the feeder tape 13, whence it is distributed along the length of one edge of the conductive rubber heating element 11 within the panel 10. The current flows across the conductive rubber layer 11, thereby producing the desired radiant heat by virtue of the resistance of the rubber layer to the flow of current. The radiant heat thus produced is emitted from the surface of the panel and is absorbed by occupants and objects in the room. The current then flows from the conductive rubber layer 11 into the oppositely placed feeder tape 14, whence it passes through terminal block 39 into the return wire 49 to complete the electrical circuit.

The electric wires 48 and 49 may be passed into the raceway 20 through an opening 53 (Fig. 1) in the top wall thereof, such opening conveniently being provided in a relatively short connecting section or terminal box section 54 of the raceway. The connection section 54 of the raceway may have the same external configuration as the main portion 20 of the raceway and may be connected thereto by short internal bridging members 55 suitably fastened frictionally, or by screws (not shown) or other means.

The usual metallic or non-metallic sheathed cable (not shown) may be employed to bring the wires 48 and 49 from the main electric circuit of the building up to the opening 53 in the raceway, such cable being fastened at the opening 53 by the usual conventional connector assembly (not shown). The electrical heating circuit includes the usual thermostat and switch (not shown) for controlling the heating to provide the desired room temperature and for turning the system on and off.

From the foregoing, it is evident that the invention provides a radiant heating installation in which electrical connections can be made to the heating elements conveniently, it being un-

necessary to get behind the ceiling or wall of the room to make such connections because a raceway having a removable cover is provided for the electrical wiring. The resulting installation is safe because the wires and connections are enclosed within a protective raceway.

The form of the raceway may be easily adapted to application to various points on a room surface, whether on a wall or a ceiling, and the raceways may be designed either to be inconspicuous so that the heating installation is not evident on casual observation or the raceways may have an ornamental appearance to fit in with the decorative or architectural scheme of any particular type of room or building. The raceway may be manufactured in standard lengths which are cut to size, if necessary, and assembled together at the time of installation.

The provision of terminal blocks on the panels in the manner described makes it possible to connect conveniently virtually any desired number of panels with the disclosed wiring system, and permits great flexibility in the placement or disposition of the panels, which may be applied to the entire surface of a room, or applied at spaced points on the surface of a room, depending on the effect desired. The provision of greatly elongated openings on the raceway for receiving such terminal blocks permits easy alignment of the raceway with the terminal blocks, with consequent convenience of installation.

The plaster ledges on the raceway facilitate finishing of the room surface after the installation is made. The system is equally adaptable to use in new constructions, or to installation in old buildings without destroying or extensively reconstructing the present walls or ceilings.

The raceway installation assembly is particularly well adapted to ceiling installations, which represent the most advantageous manner for utilizing radiant heating, because the radiant heat is normally most effectively distributed from the ceiling without undersirable convection effects. Placement of the raceway in a cove of the ceiling permits installation of full ceiling coverage in such a way as to produce an unobtrusive appearance.

Inspection of the wiring for possible defects, or repair or replacement of the wiring is easily accomplished because access to the wiring is had by simply removing the cover of the enclosing raceway.

Having thus described our invention, what we claim and desire to protect by Letters Patent is:

1. In a device of the kind described, the combination with a radiant heating panel having connector blocks projecting from a surface thereof and of definite size and definitely located relative to each other and to the edges of said panel, of a raceway body including a top wall to engage the same surface of the panel as that from which the connector blocks project, said top wall having openings spaced according to the spacing of the connector blocks and oversize relative to the latter whereby said raceway body may be assembled over the connector blocks even though the centers of said connector blocks and openings are in staggered relation, said connector blocks extending into the interior of the raceway body and the panel closing the unoccupied areas of the openings.

2. In a radiant heating system in combination, a radiant heating panel having two connector blocks projecting from a surface thereof at a substantial distance apart and disposed near one end of the panel, a wire receiving raceway having a top wall to engage the surface of the panel from which said blocks project and having openings in said top wall to receive said blocks, such opening being wider than a block and several times longer than a block so that the raceway can be moved a substantial distance in the direction of its length while the blocks are in said openings, and means for securing the raceway in place so that it contacts the lower face of the panel with the blocks extending into the raceway.

3. In a radiant heating system in combination, a radiant heating panel having two connector blocks projecting from a surface thereof at a substantial distance apart and disposed near one end of the panel, a wire receiving raceway having a top wall to engage said surface and an open face and also having openings in said top wall to receive the blocks, said openings being wider than a block and considerably longer than a block so that the raceway can be moved a substantial distance in the direction of its length with the blocks in said openings, means for securing the raceway in place so that it contacts the lower face of the panel with the blocks extending into the raceway, and a closure for said open face.

4. In a device of the kind described, the combination with a radiant heating ceiling panel having connector blocks projecting from the lower surface thereof and of definite size and definitely located relative to each other and to the edges of said panel, of a raceway body including a top wall to engage the lower surface of the panel, said top wall having openings much larger than said blocks and spaced according to the spacing of the connector blocks whereby said raceway body may be radially assembled over the connector blocks, said connector blocks extending into the interior of the raceway body.

5. In combination with electrical heating panels, a raceway for enclosing electrical conductors feeding a multiplicity of heating panels applied to the ceiling of a room, comprising an angular channel having a top wall and a back wall and adapted to fit at the junction of a wall and ceiling of a room, and spaced openings in the top wall of said raceway for receiving electrical connecting means protruding from the heating panels, said openings being greatly elongated to permit adjustably positioning the raceway with respect to said connecting means.

6. In combination with electrical heating panels, a raceway for enclosing electrical conductors feeding a multiplicity of heating panels applied to a surface of a room comprising a channel having two walls disposed at an angle and adapted to fit at the junction of two surfaces of a room in contact with said panels, and spaced openings in one wall of said raceway for receiving electrical connecting means protruding from the heating panels, said openings being greatly elongated to permit adjustable positioning of the raceway with respect to said connecting means.

7. In combination with electrical heating panels, a raceway for enclosing electrical conductors feeding a multiplicity of heating panels applied to the ceiling of a room comprising an angular channel having a top horizontal wall and a vertical back wall and adapted to fit at the junction of a wall and ceiling of a room in contact with the panels, spaced openings in the top wall of said raceway for receiving electrical connecting means protruding from heating panels, said openings being greatly elongated with respect to

said connecting means, an additional opening for passing an electrical supply line into the raceway, and a removable cover on the front of the raceway cooperating with said top wall and back wall thereof to constitute an essentially complete enclosure for electrical conductors therein.

8. In a radiant heating system, the combination of a metal raceway adapted to be attached to a room structure, an electrical radiant heating panel extending from said raceway, insulated terminal blocks on said panel, an electrical connecting means on each terminal block for feeding electrical energy to said panel, said raceway having block-receiving openings therein, and said terminal blocks extending into the interior of said raceway at said openings, and each opening being several times longer than said terminal block for adjusting the position of the raceway with respect to the panel.

9. In a device of the kind described, the combination with a radiant heating panel having connector blocks projecting from a surface thereof and of definite size and definitely located relative to each other and to the edges of said panel, of a raceway body including a top wall to engage the same surface of the panel as that from which the connector blocks project, said top wall having oversize openings for said connector blocks whereby said raceway body may be assembled over the connector blocks with the blocks extending into the interior of the raceway body.

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