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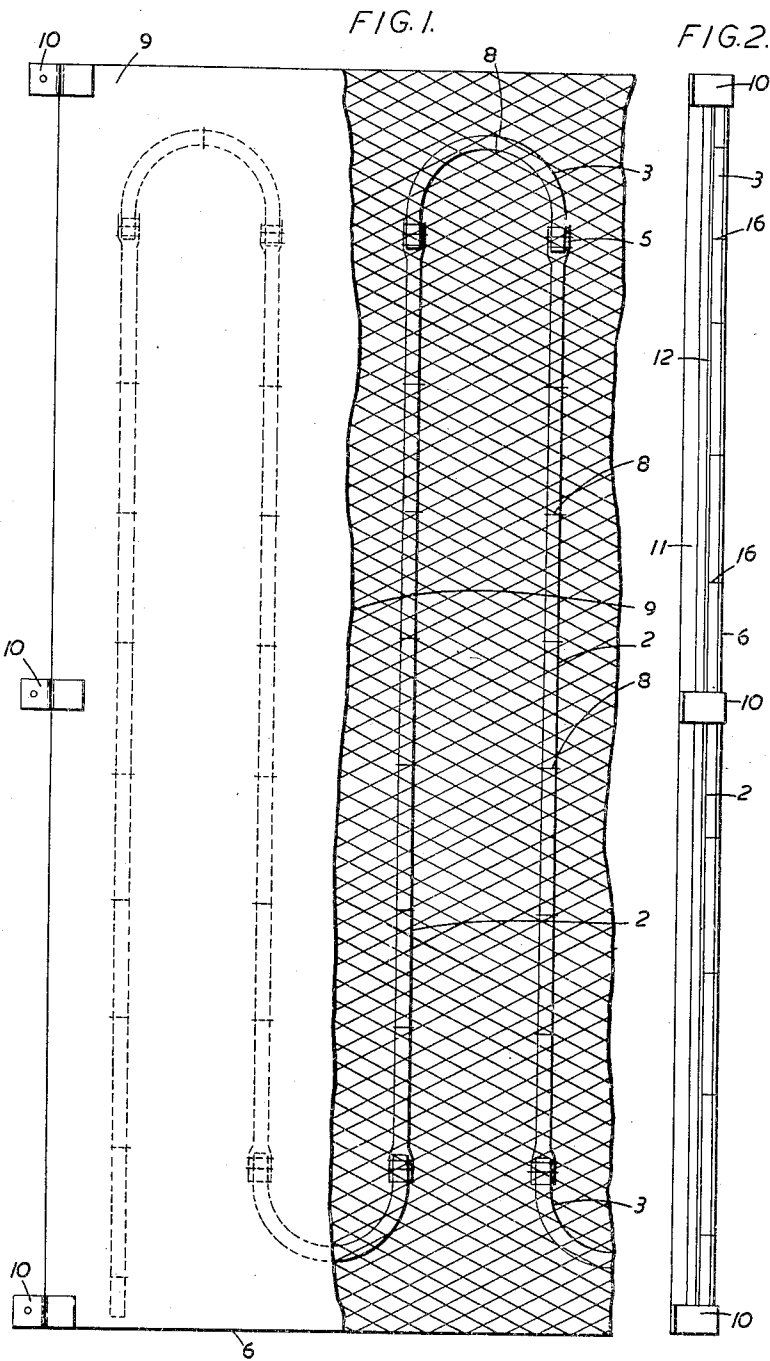
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ELECTRIC HEATING SYSTEM FOR BUILDINGS

Filed Dec. 26, 1947

2 Sheets-Sheet 1



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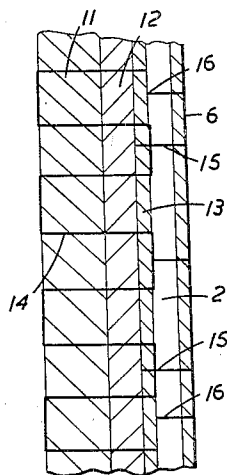


FIG. 3.

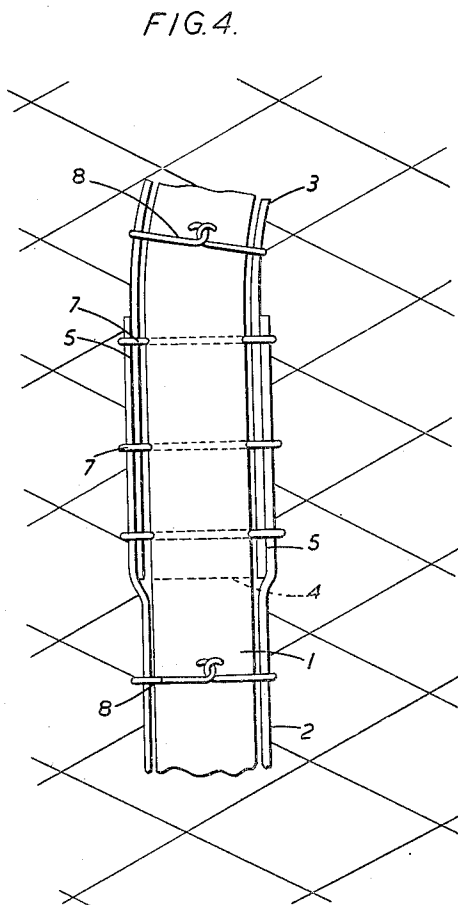


FIG. 4.

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ELECTRIC HEATING SYSTEM FOR BUILDINGS

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2 Claims. (Cl. 219—19)

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This invention relates to heating systems for buildings of the kind in which heat is diffused principally by radiation at a comparatively low temperature from the surfaces of walls, ceilings or floors and to which the heat is supplied by electric heating elements in the form of long continuously insulated wires distributed over the area from which radiation is to take place, with appropriate spacing and enclosed within the structure (wall, ceiling or floor) beneath the radiating surface thereof.

According to the present invention an electric heating element, comprising a continuously insulated wire, is disposed in and held in place in a series of straight and curved metal channel members which are connected together to form a continuous channel for the heating element, and to the backs of the channels is fixed a sheet of metal lathing. The channel members which, for example, may be of U or rectangular shape in cross-section, serve to provide mechanical protection for the electric heating element and also give stiffness to the metal lathing, although the channel members may be comparatively light in weight. The metal lathing facilitates the keying of plaster or other heat-conducting material in place and provides a good heat distributing surface and also provides a simple means of installing the heating element.

The electric heating element, the channel members and the metallic lathing together form a heating unit which may be installed in the wall, ceiling or floor of a building by being embedded in plaster or other heat-diffusing material to form a heating panel. On the other hand, the unit may be embedded in heat-diffusing material to form a heating panel as part of the manufacturing operation.

The invention will be described further with the aid of the accompanying drawings which illustrate two forms of construction as examples and wherein:

Figure 1 illustrates one construction and is a front elevation shown broken away.

Figure 2 is a side elevation of another construction.

Figure 3 is a fragmentary view of Figure 2 but being in section and drawn to a larger scale.

Figure 4 is a fragmentary rear view of Figure 1.

In the particular examples now to be described, the heating element comprises a single insulated conductor which is folded at about its mid-point the two halves being placed side by side and enclosed in a flattened lead sheath which is sealed at the folded end of the conductor. A heating

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element constructed in this manner is described more fully in the specification of British Letters Patent No. 543,272. A portion of the heating element is indicated in Figure 4 by the reference numeral 1. It is housed within and protected by straight metal channel members 2 and curved metal channel members 3. The straight channel members lie side by side and are parallel with each other and are of the same length and at their ends they are joined by the curved channel members 3 to form a continuous channel of zig zag configuration for the reception of the heating element 1. The straight and the curved channel members are of rectangular cross-section and are open on the side facing the rear of the panel.

To connect the curved channel members 3 to the ends of the straight channel members 2, the two sides of a curved channel member are arranged to fit within the ends of the two adjacent straight channel members in the manner indicated in Figure 4. Each straight channel member has two sides and a base. Adjacent its ends the base of a straight channel member 2 is cut away so that the two sides extend for a short distance beyond the base. In Figure 4 the dotted line 4 indicates the end of the base and the numerals 5 indicate those portions of the sides which extend beyond the base. As will be seen from Figure 4, the portions 5 are offset by a small amount but are parallel and they accommodate between them with a small clearance only, the two sides of a curved channel member 3, the base of the curved channel member abutting against the end of the base member of the straight channel member 2. When the curved channel members have been fitted into the straight channel members, a continuous channel of zig-zag form as seen in Figure 1 is provided for the heating element.

A sheet 6 of metal lathing (see Figure 1) is attached to the outer surfaces of the bases of the straight and of the curved channel members, that is to say, to the backs of those members, to hold the metal lathing in contact with those members and provide a heat distributing surface.

The ends of the curved channel members 3 are held in place in the ends of the straight channel members 2 by wires 7 (see Figure 4) which are bent round the ends of the straight channel members and over the edges of the adjacent sides of the straight and curved channel members, the inner ends of the wires then being bent at right angles so that they lie against the inner surfaces of the sides of the curved channel members. These wires preferably are also threaded through

the sheet 6 of metal lathing so that the latter may be held against the backs of the channel members. The wires 7, however, need not be threaded through the metal lathing but may be short lengths of wire attached to the sides of the straight channel members 3, for example, by welding.

In the construction illustrated in Figures 1 and 4, the heating element 1 is held in the continuous channelling formed by the straight and curved channels, by wires 8 which are threaded through the sheet 6 of metal lathing and the ends then twisted together on the open side of the channelling as indicated in Figure 4. The wires are placed at appropriate intervals along the length of the channelling.

The heating element, its protective metal channelling and the metal lathing attached to the channelling forms a heating unit which can be made into a heating panel by embedding the unit in plaster or other heat-diffusing material, the covering of the metal lathing with such material providing a heat radiating surface for the panel. This may be carried out as part of the manufacture or the embedding of the unit may be effected at the site where the unit is to be installed. In Figure 1 a part of the sheet 6 of metal lathing is shown covered with a heat diffusing material 9.

The straight and curved channel members can be made of thin metal for the sake of lightness whilst giving the required amount of protection against damage to the heating element, due, for example, to the driving in of nails into the plaster after installation. The channel members also serve to stiffen the sheet or sheets of metal lathing attached thereto to facilitate handling.

The sheet 6 of metal lathing is provided with lugs or brackets 10 for the attachment of two adjacent sheets to one another and is cut to the appropriate size for the heating element and the latter is arranged to cover the area of the sheet more or less uniformly so as to obtain a uniform distribution of heat from each part of the area of the panel.

Where it is desired to control the radiation of heat from the panel by directing it towards the front thereof, the rear part of the heating unit can be readily fitted with a heat insulating member 11, as indicated in Figures 2 and 3, to which figures reference will now be made. The heat insulating member consists of a pad of laminated felt material made up to the required size and enclosed in an open mesh fabric. The pad may be of light weight and sufficiently flexible to enable the panel to be fitted to a curved surface of either convex or concave form. Where the panel is to be fitted to a flat surface the pad can be stiffened by attaching to it on the side facing towards the front of the panel, a stiffening board 12 made of compressed and bonded fibrous material. To enable the heat insulating member 11 and the stiffening board 12 to be readily attached to the heating unit a sheet 13 of metal lathing is placed over the board 12 and the members 11, 12 and 13 are stitched together. The metal lathing 13 may be a light mesh. The stitching is indicated in Figure 3 by the reference numeral 14. The members 11, 12 and 13 thus stitched together may then be fixed to the channel members 2 and 3 and to the sheet 6 of metal lathing attached to the channel members by wires 15 which are passed through the sheets 6 and 13 of lathing. The wires can be readily looped around the channel members and then be twisted together on the outside of the

sheet 6. The main purpose of the second sheet 13 of metallic lathing or mesh is to provide a convenient anchoring means for the wires 15 used for the attachment of the heat insulating member 11. It will be understood that if the stiffening board 12 is not used, the heat insulating member 11, and the sheet 13 of metal lathing or mesh are stitched together. In the construction illustrated in Figures 2 and 3 the heating element is held in place in the channel members 2 and 3 by plaster or other heat diffusing material and the sheet 6 of metallic lathing is attached to the backs of the channel members by wires 16 which are threaded through the sheet and around the channel members and the ends of the wires twisted together on the outside of the sheet 6.

As an alternative to a cable having a sheath of lead, the heating element may consist of a cable in which the lead sheath is replaced by a covering of cotton which has been treated to render it flameproof or of asbestos braid.

A heating unit constructed in accordance with the present invention can be made of relatively light weight and yet have the required mechanical strength and rigidity for handling purposes and at the same time, provide adequate means for the support of the heating element and for protecting it against mechanical damage.

What we claim as our invention is:

1. A heating unit for an electric heating panel, comprising two sets of straight and curved metal channel members having inter-fitting ends and forming a continuous length of channelling which is open on the rear side of the unit, means for holding the inter-fitting ends together, a sheet of metal lathing disposed on the front side of the channelling and attached thereto and distributed substantially uniformly over the channelling, a continuously electrically insulated wire within the channelling, means holding the wire therein, a second sheet of metal lathing disposed behind the channelling and attached to the first sheet, a flexible pad of heat-insulating material disposed behind the second sheet of lathing and stitching passing through the pad and that sheet, attaching the pad to that sheet.

2. A heating unit for an electric heating panel for attachment to a structural part of a building for the radiation of heat at a relatively low temperature into a room of the building, the said unit comprising a series of straight metal channel members placed side by side but spaced from each other and a series of curved metal channel members joining the ends of the straight channel members, the two sets of channel members having interfitting ends and forming a continuous length of channelling of zig-zag form open on the rear side of the unit, means for holding the interfitting ends together, a sheet of metal lathing attached to the closed side of the channelling on the front side of the heating unit and distributed substantially uniformly over the channelling, a heating element comprising a continuously insulated wire disposed within the channelling and extending longitudinally for the whole length thereof, and a pourable and settlable heat diffusing material disposed within the said channelling and making intimate contact therewith and with the heating element and holding the latter in fixed relation to the channelling and to the sheet of metal lathing.

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