

April 12, 1960

L. S. ADAMS
RADIANT HEATING PANEL AND CONSTRUCTION
FOR BUILDINGS AND THE LIKE

2,932,711

Filed May 10, 1957

2 Sheets-Sheet 1

Fig. 1.

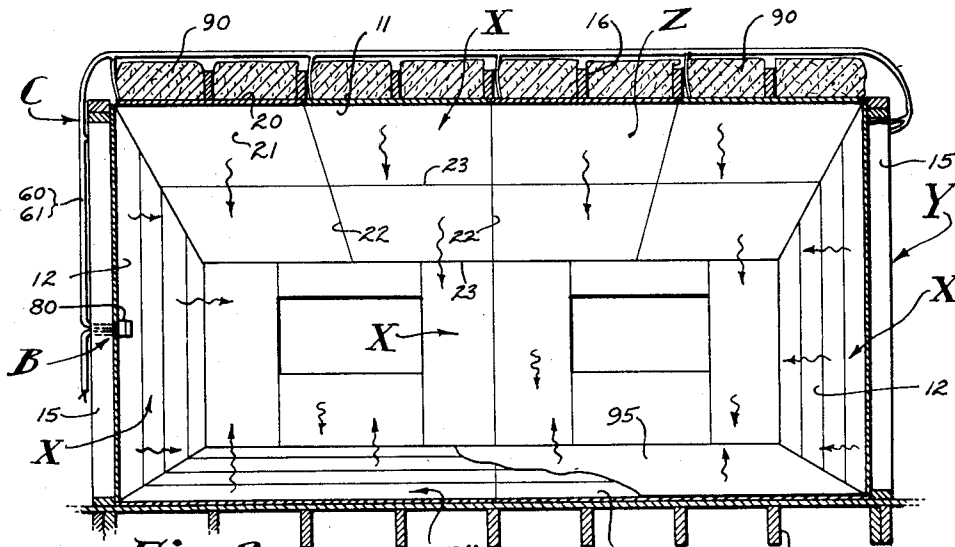


Fig. 2.

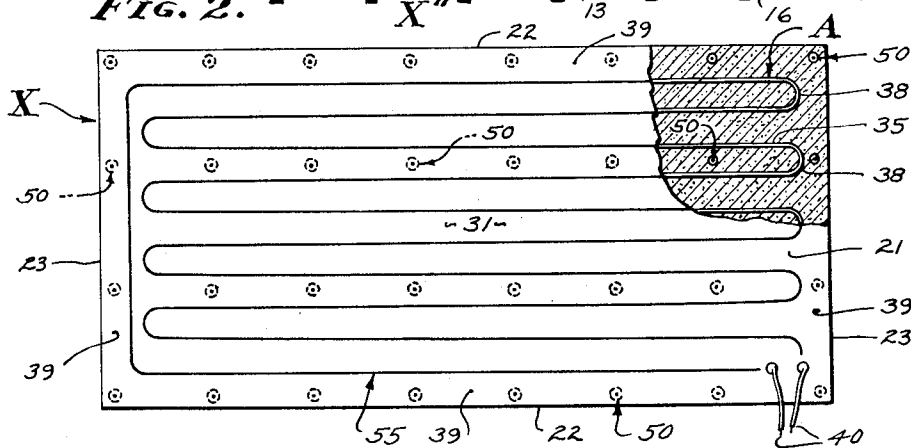
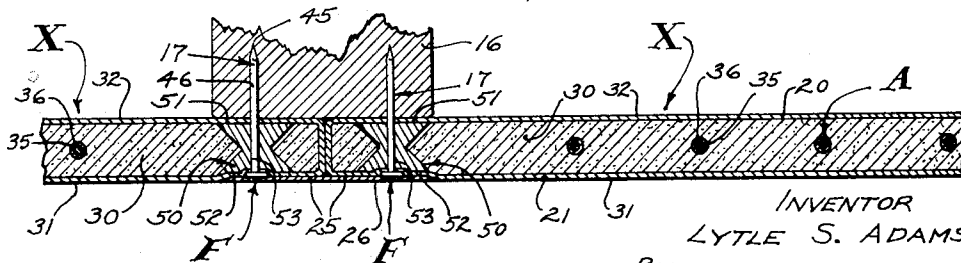


Fig. 3.



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Fig. 4.

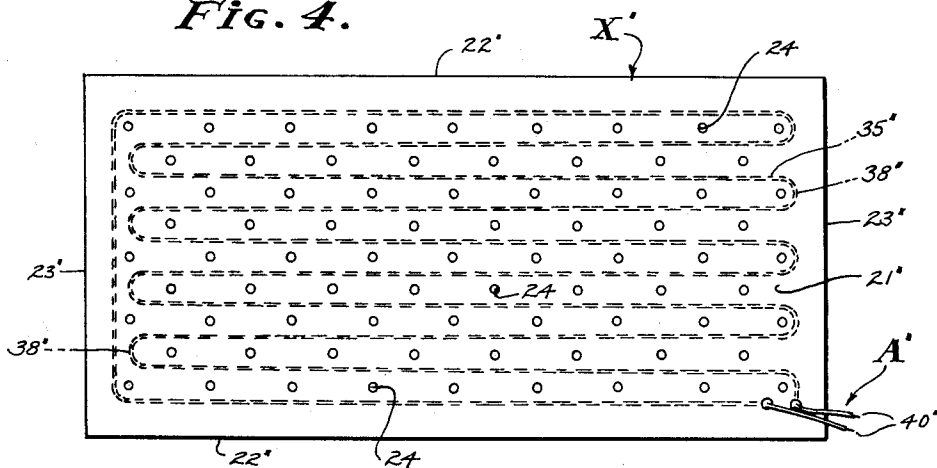


Fig. 5.

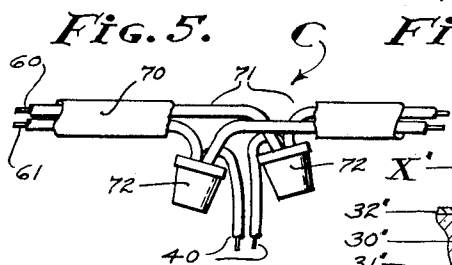


Fig. 6.

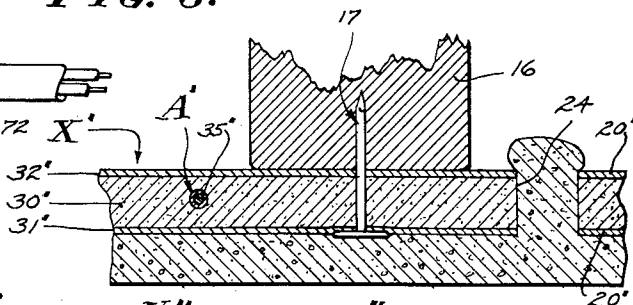


Fig. 7.

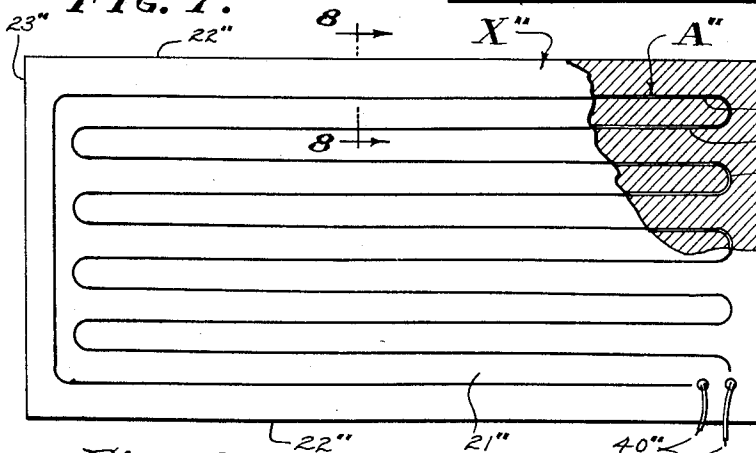


Fig. 9.

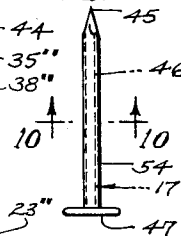


Fig. 10.

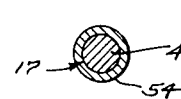
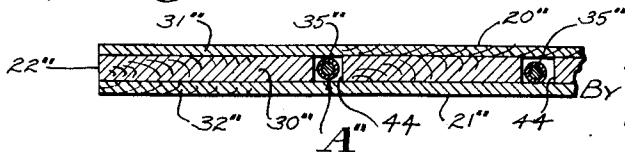


Fig. 8.



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2,932,711

RADIANT HEATING PANEL AND CONSTRUCTION FOR BUILDINGS AND THE LIKE

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Application May 10, 1957, Serial No. 658,381

1 Claim. (Cl. 219—19)

This invention relates to radiant heating panels for building constructions and the like and is particularly concerned with the heating of chambers, for example the rooms of dwellings or houses. A general object of this invention is to provide modular units in the form of panels that are readily installed by anybody, whether skilled or unskilled, simply by the use of a chart or the like printed on the unit as a guide. It is to be understood, however, that the invention in its broad sense relates to any and all surfacings of the type under consideration whether they be indoors or out of doors. That is, the structure of the present invention may be employed in any building structure to heat the chambers thereof, and may be employed to heat out of doors surfacings such as, for example, the paving or floors of sports areas, playgrounds, and roadways, etc.

It is often desired to raise, maintain or increase the temperature of air in a chamber in order to make it more comfortable. Indoor heating may be accomplished by the introduction of heated air or by the circulation of heated fluid beneath the surfacing or through conduits therein. More specifically, cold and heat radiate from the surfaces that define a chamber or room, and therefore radiant heating is widely employed and involves heating of air within a chamber by radiation of heat from the panels or walls or floors forming said chamber. It is usual practice to run heated fluid through ducts imbedded in said walls, or to run an electric current through conductors embedded in said walls. Installation of lengthy ducts or conductors is not only difficult and time consuming but requires special skills. That is, the electrical balance of each conductor must be exacting and the conductors must be laid in a particular pattern. In known methods of installation the conductors must be used only as furnished by the manufacturers and cannot be cut or spliced one to another, and if the conductors are not laid exactly as specified the proper results are not obtained. In other words, known methods of radiant heating by using electrical conductors is complex and not altogether satisfactory.

It is an object of this invention to provide means whereby radiant heating, in general, is simplified to the end that anybody may readily install a system or structure for efficient and satisfactory radiant heating. The structure of present invention involves the provision of ready-made units constructed in a manner which renders them practical for installation at a minimum of cost by persons having but a minimum of experience.

It is another object of this invention to provide radiant heating panels adapted for use in so-called "dry wall construction" that can be merely fastened in working position and then put into operation by connecting them to

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a power source. By supplying electrical energy to a plurality of like panels, adequate radiant heating is effectively gained.

It is still another object of this invention to provide radiant heating panels that can be trimmed in order to be fitted one with the other. By providing marginal portions of the panels that are free of electrical conductors a substantial amount of trimming can be done without disturbing the conductors.

It is also an object of this invention to provide radiant heating panels that can be fastened or secured to the wall, floor or ceiling as by use of nails, all without adverse effect upon the electrical conductors. With the structure that I provide there is an insulator surrounding each fastener to protect the conductors even when said conductors are in contact with a fastener. The heating elements are imbedded in the panel and when the fastener or nail is driven through the panel the shank of the nail which is covered by an insulating sleeve prevents any possibility of contact between the nail and any conductor imbedded in the panel.

It is still another object of this invention to provide a structure of the character above referred to that can be supplied in standardized modular sizes and then cut or trimmed to exact size or shape or configuration without destroying the heating elements that are included in the construction.

An object of this invention is to provide a simple and practical paneling of the type above referred to that is inexpensive to make and which is inexpensive to install and maintain. The paneling of the present invention may be in the form of standard sized rocklath or wall-board units with complete wiring circuits incorporated in its construction and ready for installation and operation.

The various objects and features of my invention will be fully understood from the following detailed description of the typical preferred forms and applications of my invention, throughout which description reference is made to the accompanying drawings, in which:

Fig. 1 is a sectional view taken through a typical building construction and showing the application of the panels of the present invention. Fig. 2 is an enlarged plan view of one of the panels, being a finished wall board panel. Fig. 3 is an enlarged detailed sectional view showing the manner in which the panel of Fig. 2 is fastened to the building construction. Fig. 4 is a view similar to Fig. 2 and showing a plan view of another form of panel, said panel being in the form of "button-board" or lath. Fig. 5 is a detailed view showing the electrical connections that may be employed in carrying out the invention. Fig. 6 is a view similar to Fig. 3 and showing the manner in which the panel is secured to the framing of the building construction. Fig. 7 is a view similar to Figs. 2 and 4 and shows a plan view of another form of panel, said panel being in the form of ply-board flooring. Fig. 8 is an enlarged sectional view taken as indicated by line 8—8 on Fig. 7. Fig. 9 is a view of a fastener that I employ in securing the panels in working position, and Fig. 10 is an enlarged sectional view taken as indicated by line 10—10 on Fig. 9.

The radiant heating panels X, X' and X'' of the present invention are particularly adapted to use in building construction. Throughout the drawings, I have illustrated my invention as it is applied to a building structure Y, this being the preferred use for the panels X, X' and X'' that I provide. As clearly illustrated

throughout the drawings, the panels X, X' and X'' that I provide are installed in the building structure Y to form a lining or to establish one or more chambers Z. A typical chamber Z is illustrated and involves generally a ceiling 11, side walls 12 and a floor 13. The elements or surfacings 11, 12 and 13 are composed or made up of a plurality of like panels respectively and are shown as simple flat elements. The panels X and X' are adapted to be jointed together at the adjoining edges thereof while the panels X'' simply abut at the adjoining edges thereof. The panels X, X' and X'' are made in modular sizes and shapes, for example, a standard size and shape of panel is four feet by eight feet, and other modular sizes divisible into said standard dimensions are employed as circumstances require, for example, two feet by eight feet, or two feet by four feet, etc. It will be readily understood how modularly divisible sized panels X can be made.

The building structure Y may vary widely and for purpose of illustration I have shown a wooden frame construction commonly used in making dwellings. Such dwellings may involve a number of similar chambers Z, each chamber having a ceiling 11, side walls 12 and a floor 13, as above set forth. In order to support the above-mentioned surfacings a frame-work is provided which includes spaced vertically disposed studs 15 forming the side walls, and spaced horizontally disposed joists 16 forming the floor and ceiling. The studs 15 and ceiling joists 16 are normally spaced apart on sixteen inch centers and are adapted to receive a surfacing of lath or wallboard, as the case may require. When plastered walls and ceilings are desired rocklath is installed (panels X'), or when lastering is not a requirement wallboard is installed (panels X). In any case the panels of the present invention may be formed either as lathing or rocklath panels X', or as a finished wall or wall-board panels X, or as flooring panels X''. As shown, the panels X, X' and X'' are secured to the studs 15 or joists 16 as by fasteners F in the form of nails 17.

Referring to Fig. 2 of the drawings and the panel X that I provide, each panel X is alike, except for the particular modular size thereof, and is characterized by a flat rectangular body of uniform thickness. The panel X involves, generally, a back face 20 engageable either with the studs 15 or joists 16, a front face 21, side edges 22 and end edges 23. When the panels X are in the form of wall-board (see Figs. 2 and 3) they are imperforate and the marginal portions along the edges 22 and 23 are somewhat recessed at 25 in order to receive a tape 26. The tape 26 is cemented in place, the cement being troweled to form a smooth invisible joint.

The body of the panel X may vary in construction. That is, the body may be laminated or may be pressed or formed in any suitable manner and of any suitable material, such as, for example, pressed wood fibers, or gypsum lined with paper pulp. In the drawings I have shown pressed gypsum board panels X which involve a filler 30 of gypsum encased in front and back sheets of paper 31 and 32, respectively. The body of the panels X formed of laminate, filler 30 and sheets of paper 31 and 32, is pressed to the desired thickness and cured by applying heat. It will be apparent that panels X formed in this manner are easily cut to size and are easily trimmed for installation.

In accordance with the present invention, I have provided the heating means A and, as shown in the drawings, the means A is incorporated in the panel X. Since the panel X is essentially a structural element it is of substantial body or thickness. The means A is an electrical means involving an elongate heating cable or wire 35, the wire 35 being encased in electrical insulation 36, and supported and carried within the body of the panel X. As shown, the wires 35 extend across the panel X, there being a plurality or series of parallel wires 35 at spaced intervals. The spacing between the

wires 35 may be governed by the various factors involved, say for instance one and one-half inches apart. In practice, a longitudinally extending heating element, that is formed of a single length of wire 35 is turned or bent back on itself one or more times at 38. The bent portions 38 of the wire 35 are spaced inwardly from the ends of the panel X, say for instance four inches. Also, the outermost elements of the wire are spaced inwardly from the edges of the panel X so that there are marginal portions 39 at each edge of the panel X that may be cut and trimmed as circumstances require without cutting or damage to the wire 35.

Referring to Fig. 4 of the drawings and the panel X' that I provide, each panel X' is alike, except for the particular modular size thereof, and is characterized by a flat rectangular body of uniform thickness. The panel X' involves, generally, a back face 20' engageable either with the studs 15 or joists 16, a front face 21', side edges 22' and end edges 23'. When the panels X' are in the form of lath (see Fig. 4) perforations 24 are provided therein in order to receive plastering, and the edges 22' and 23' are simply formed at right angles to the plane of the faces 20' and 21' that are parallel with each other.

The body of the panel X' may vary in construction like the panel X. That is, the body may be laminated or may be pressed or formed in any suitable manner and of any suitable material, such as, for example, pressed wood fibers, or gypsum lined with paper pulp. In the drawings I have shown pressed gypsum board panels X' which involve a filler 30' of gypsum encased in front and back sheets of paper 31' and 32', respectively. The body of the panel X', formed of laminate filler 30' and sheets of paper 31' and 32', is pressed to the desired thickness and cured by applying heat. It will be apparent that the panels X' formed in this manner are easily cut to size and perforated at 24, and are easily trimmed for installation.

In accordance with the present invention, I have provided heating means A' in connection with the panel X', in the same manner as above described in connection with the panel X. The means A' is an electrical means involving a single length of wire 35' that is turned or bent back on itself one or more times at 38'. The bent portions 38' of the wire 35' are spaced inwardly from the ends of the panel X' and there is also a marginal portion 39' at each end of the panel X' that may be cut and trimmed as circumstances require.

Referring to Figs. 7 and 8 of the drawings and the flooring panel X'' that I provide, each panel X'' is alike, except for the particular modular size thereof, and is characterized by a flat rectangular body of uniform thickness. The panel X'' involves, generally, a back face 20'' engageable with the floor joist or sub-flooring, or the like, of the building construction, a front face 21'', side edges 22'' and end edges 23''. When the panels are used as flooring panels X'' they are imperforate and are such as to present a reasonably tough durable surface.

The body of the panel X'' may vary in construction like the panels X and X'. That is, the body may be laminated or may be pressed or formed in any suitable manner and of any suitable material, such as, for example, pressed wood fibers, or wood veneers laminated together. In the drawings I have shown plywood panels X'' which involve a filler or core 30'' of wood veneer covered with front and back wood veneers 31'' and 32'', respectively. The laminate body formed of the core 30'' and veneers 31'' and 32'' is bonded together by a cement or adhesive and formed to the required thickness, and is easily trimmed for installation.

In accordance with the invention, I have provided heating means A'' in connection with the panel X'', in the same manner as above described in connection with the panels X and X'. In the case of the panels X'' the core 30'' is cut or interrupted to provide a channel 44

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that is turned or bent back on itself one or more times in order to receive and house a single length of wire 35" that is also turned in a like manner to lie in the channel 44. The channel 44 has suitable bent portions that accommodate bent portions 38" of the wire 35", said bent portions of the channel 44 being spaced inwardly of the ends of the panel X", to the end that the panel may be cut and trimmed as circumstances require.

The cables or wires 35, 35' and 35" are resistance type wires and have leads that project from the back face of the panel. As illustrated, each of the wires 35, 35' and 35" is provided with a pair of leads 40, 40' and 40", respectively, one at each terminal end thereof and which is adapted to be connected to the power supply. In accordance with the invention panels of different size will require cables or wires of different length. In other words, the size or area of the particular panel will determine the length or wire required to heat the same. It is important, however, that each cable or wire 35, 35' and 35" be adapted to connect with a common power supply and function uniformly as compared with each other. That is, each panel X, X' and X" and heating means A, A' and A" must function alike, regardless of size or configuration or length of wire. Therefore, each cable or wire 35, 35' and 35" is of material and gage to gain a certain given resistance and heating characteristic. For example, a small panel is provided with a short wire of suitable gage, while a large panel is provided with a long wire of suitable gage. It will be apparent that the gage of wire may be properly determined for each length thereof in order to properly function in each individual panel X, X' or X", as the case may be.

As shown, the cables or wires 35, and 35' are imbedded in the body of the panels X and X'. In the particular cases illustrated the wires 35 and 35' are suspended in and supported by the gypsum 30 and 30'. When the gypsum is cured and hardened the wire is permanently secured in working position, the leads 40 and 40' being projected through openings provided in the back sheets 32 and 32' of the panels, to the end that the leads extend from the panel to be connected with the power supply, later described.

A feature of the present invention is the provision of the insulated fasteners F that I provide for securing the panels in the building structure Y. The fasteners F are preferably in the form of nails 17, each of which has a point 45 adapted to anchor in the studs or joists of the building structure, a shank 46 adapted to extend through the body of the panel, and a head 47 adapted to be drawn into tight engagement with the front face or front sheet 31 of the panel X. The fastener F, or nail 17, is of ordinary design, but it is provided with an insulator 50 that is coextensive with and overlies the shank. The insulator 50 is made of dielectric material and may be a separate sleeve-like part or collar of wood or molded plastic material, for example, a phenolic material. As shown, the insulator 50 is preferably a round spool-shaped part with flat upper and lower faces 51 and 52 and with a central bore 53 extending therethrough and opening at the faces. The faces 51 and 52 are of substantial diameter while the body of the insulator 50 intermediate the faces is of reduced diameter. Thus the insulator is adequately anchored in the filler 30 of the panel X giving reliable support when a fastener is engaged through the bore 53.

In Figs. 9 and 10 of the drawings I have shown a coating 54 applied to the shank 46 of the nail 17. It will be apparent that the insulating coating 54 will prevent the fastener from contacting or shorting with the wire 35, if the insulator 50 is not used.

In order to facilitate installation of the panels and to insure a reliable heating system, each panel may be provided with a full-sized diagram 55 of the wire 35, 35' or 35", imprinted thereon, preferably on the front face

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thereof. The diagram (see Fig. 2) presents an image that coincides with the position of the wire to the end that fasteners can be applied with little or no danger of interfering with the wire. Further, the diagram 55 indicates the positions of the insulators 50 and of the extent of the marginal portions 39. It will be readily apparent that a diagram can be imprinted onto the faces of the panels X' and X" in a like manner.

The power supply C is an electrical power supply involving a pair of insulated conductors 60 and 61. The conductors 60 and 61 are non-heating conductors covered by a dielectric insulation 70. The insulation 70 may be easily stripped as at 71 and the conductors 60 and 61 connected to the pair of leads 40, 40' or 40". The conductors are of substantial length and extend between the panels so that the wires 35 are connected in parallel with each other. Connectors 72, as shown, may be employed to make the electrical contact between the conductors 60 and 61 and the leads 40. It will be apparent that each of the panels X, X' and X" and wires 35, 35' and 35" therein will be energized when the conductors are powered.

A heat control B is provided and involves an electrical junction box 80 that houses a control switch. The control switch may be manually operated or it may be controlled automatically by means of a thermostat responsive to room or chamber temperature. It will be apparent that an electrical circuit can be opened or closed depending upon the temperature desired in the chamber Z and to the end that electrical energy is supplied to the conductors 60 and 61 and cables or wire 35, 35' and 35" from power lines 63.

From the foregoing it will be apparent that I have provided simple and practical unitized panel construction for radiant heating systems. With the construction that I provide, the individual panel units X, X' and X" are readily trimmed and installed in working position by nailing to the framework of the building structure Y. Small, insignificant and odd sized shapes may be readily supplied from ordinary sheets of like panels, devoid of wiring. If the panels are in the form of perforated lath, or panels X', the front faces thereof are readily plastered (see Fig. 8). If the panels are in the form of smooth wall-board, or panels X, the joints are taped and the heads of the fasteners F are covered with cement (see Fig. 3). If the panels are in the form of plywood flooring, panels X", the joints are simply abutted and a suitable floor covering is provided as at 95 (see Fig. 1), for example a resilient rubber mat, or the like. Suitable insulation batting 90 is laid behind the panels X, as shown, to the end that the heat does not radiate from the back face 20 but only from the front face 21 thereof.

Having described only the typical preferred forms and applications of my invention, I do not wish to be limited to or restricted to the specific details herein set forth, but wish to reserve to myself any variations or modifications that may appear to those skilled in the art and fall within the scope of the following claim.

Having described my invention, I claim:

60 A building lath panel for radiant heating and including, a flat rectangular body of uniform thickness and having a core of gypsum encased within front and back facings and with rows of perforations through the body and opening at opposite faces of the body, heating means carried by the body and comprising an electrical cable of determined resistance imbedded in working position and supported in the body, dielectric insulation surrounding the cable and isolating it electrically from the core, said cable extending back and forth transversely of the body and having uniformly spaced parallel elements intermediate said rows of perforations and terminating at a point spaced from the edges of the body leaving a marginal trim portion devoid of cable, an electrical lead extending from each end of the cable and accessible at one face of the body to be connected with a power sup-

ply, and an image impressed on one face of the body, and coinciding with the cable imbedded therein.

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