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3,135,040

PREFABRICATED HEATING STRUCTURE AND METHOD OF INSTALLING

Filed Jan. 29, 1962

2 Sheets-Sheet 1

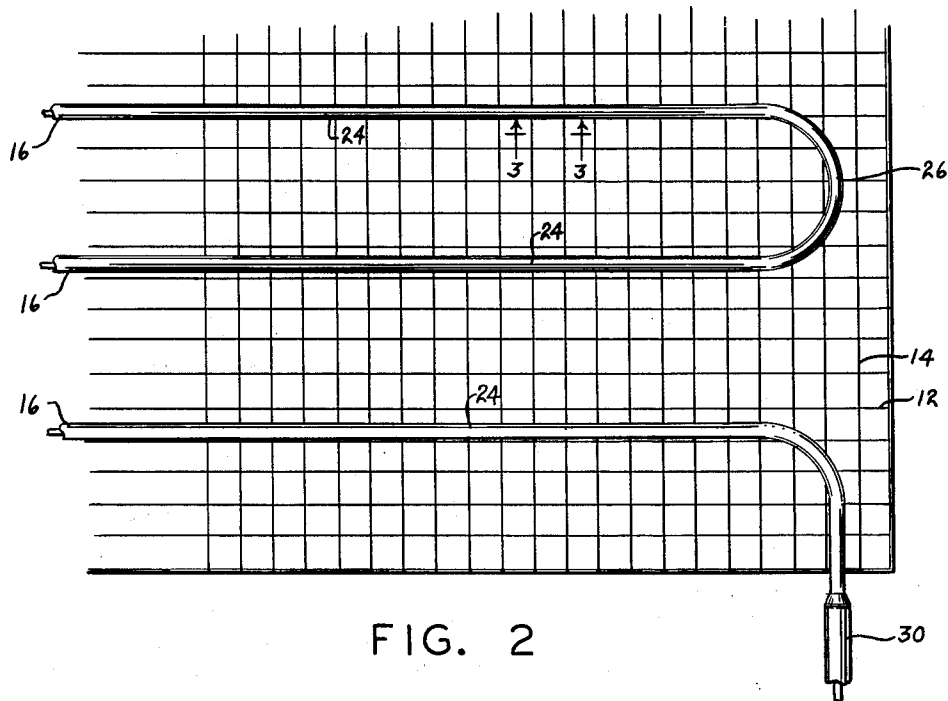


FIG. 2

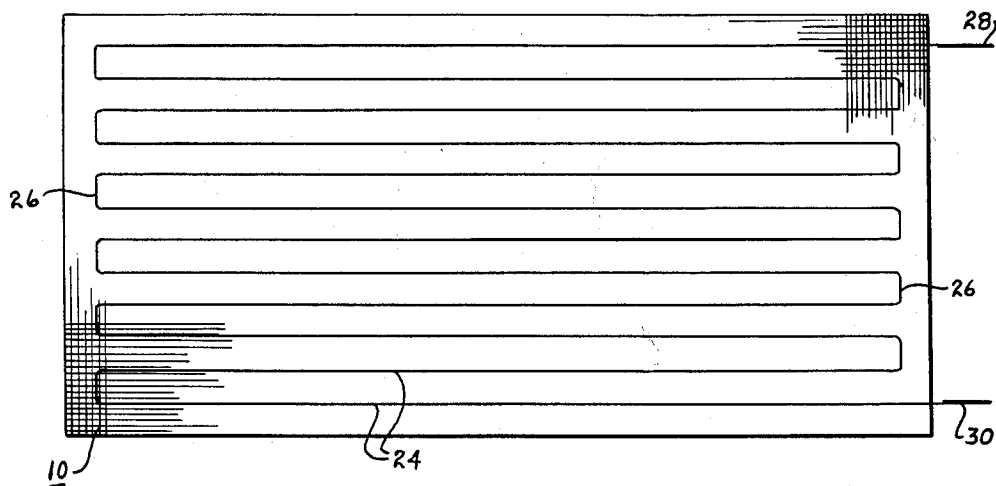


FIG. 1

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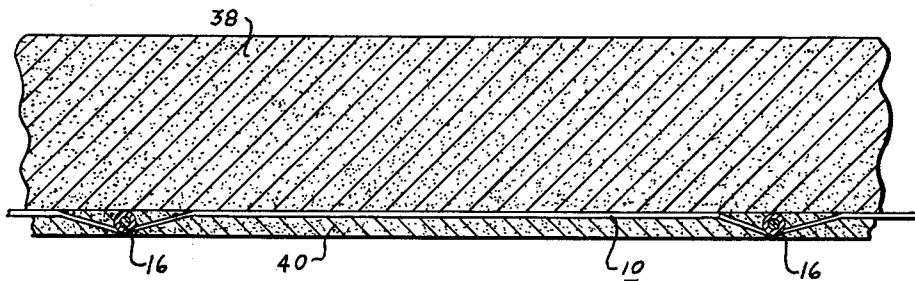


FIG. 5

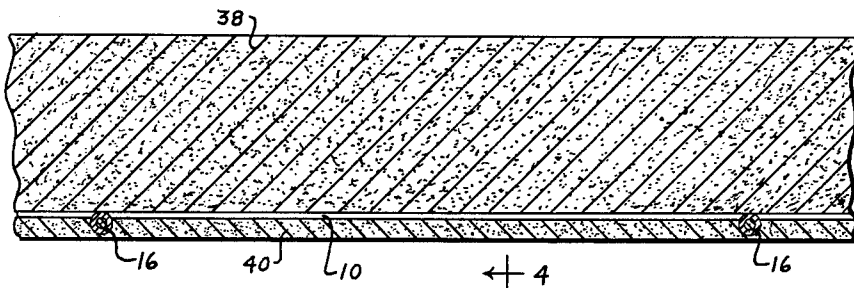


FIG. 6

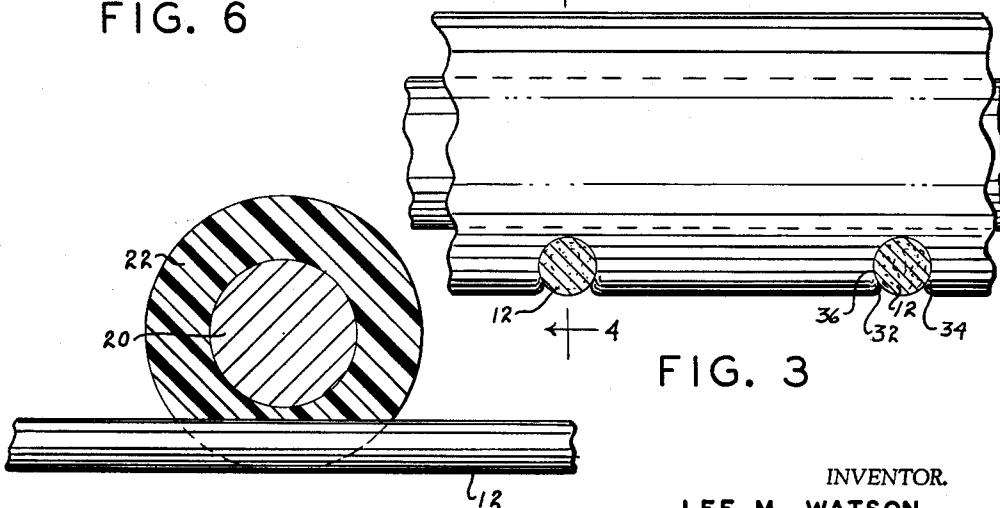


FIG. 3

FIG. 4

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PREFABRICATED HEATING STRUCTURE AND METHOD OF INSTALLING

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2 Claims. (Cl. 29—155.62)

The present invention relates to a heating structure for use in building constructions and to a method of making and installing the heating structure.

Electrical heating for homes and offices and industrial buildings is becoming one of the principal types used today, and in view of the many advantages of this type of heating, including cleanliness, space saving and being service free, it will in all probability become increasingly popular, particularly in new construction and in extensive remodeling of old structures. While electrical panels adapted to be installed as units have been tried and are being used to a limited extent, this type has certain inherent disadvantages, particularly lack of versatility and adaptability to various types of construction and space size and shape. The trend therefore has been in the direction of embedding individual wires in the masonry or plaster ceilings or floors. This type of installation, while versatile and readily adaptable to any type of heating requirements, involves the tedious operation of stringing and securing the individual strands to a partially completed ceiling or floor before the final coating or layer of the ceiling or floor structure is applied. Various types of frames or the like, such as wire mesh, carrying the heating wire have been tried, but these are often difficult to install, expensive and not sufficiently versatile to permit their general use in all types of building structures. It is therefore one of the principal objects of the present invention to provide a prefabricated heating structure for buildings and the like, in which the heating wires can easily and readily be arranged to any desired predetermined pattern or configuration, and which can be secured firmly to a prepared surface by merely pressing the structure against the surface, thus permitting rapid installation of the heating structure over a wide area in a minimum amount of time and without the use of any special tools or equipment.

Another object of the invention is to provide a highly flexible and versatile heating structure for use in building construction, either new or old, which can be effectively used in plaster, masonry and dry-wall construction and which can be left exposed or fully enclosed or embedded in the floor or ceiling construction with only a relatively thin layer of material.

Still another object of the invention is to provide a heating structure which consists of a coarse mesh, non-metallic material with strands of insulated heating wire adhered thereto and which is secured to a supporting surface such as a ceiling or sub-floor by an adhesive material.

A further object of the invention is to provide a heating structure of the aforesaid type which, after being applied to the supporting structure, does not interfere with satisfactory installation or application of the final coat or layer of cement, plaster, masonry, paint or other compositions of these types.

Another object of the invention is to provide a heating structure for incorporation in building structures and the like, which can be readily manufactured in plant facilities, rolled or folded into compact packages for easy handling and shipping, and which can be applied to the ceiling structure in large, sheet-like layers over wide areas of various sizes and shapes.

Another object is to provide a method of fabricating

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and installing a heating structure of the foregoing type embodying the present novel structure.

Additional objects and advantages of the present invention will become apparent from the following description and accompanying drawings, wherein:

FIGURE 1 is a plan view of one form of the present heating structure showing it in condition for installing in a ceiling or floor structure;

FIGURE 2 is an enlarged fragmentary plan view of the heating structure shown in FIGURE 1;

FIGURE 3 is a further enlarged, fragmentary view of the heating structure shown in FIGURES 1 and 2, taken on line 3—3 of FIGURE 2;

FIGURE 4 is a cross sectional view through the heating structure shown in the preceding figures, taken on line 4—4 of FIGURE 3;

FIGURE 5 is a vertical cross sectional view through the ceiling structure showing the present heating structure incorporated therein; and

FIGURE 6 is a vertical cross sectional view through a ceiling structure showing the present heating structure incorporated therein in a manner different from that shown in FIGURE 5.

Referring more specifically to the drawings, the heating structure shown in FIGURE 1 consists of a carrier 10 of a fabric-like material of coarse mesh, numerals 12 and 14 designating the warp and the woof of the fabric. The coarse mesh material illustrated in FIGURE 2 is actual size and shows a spacing of the intersecting strands of approximately one-fourth of an inch, a spacing which has been found suitable for most installations. A heating element wire 16 is mounted on and secured to the carrier by thermoplastic material in any desired pattern to give the required heating characteristic of the installation. The foregoing structure is extremely flexible and may be rolled or folded for handling and shipping, and may be installed easily around corners and readily mounted on curved and angular surfaces.

The heating wire 16 consists of a resistance wire 20 of copper, bronze or brass coated with a thermoplastic insulating material 22 and is placed on carrier 10 in any predetermined pattern, the one shown consisting of parallel strands 24 connected by curved portions 26 at the ends of strands 24. Various other configurations of the heating wire may be made to satisfy requirements. The ends of the heating wire preferably extend over the same edge or end of carrier 10 and are connected to cold wires 28 and 30, which in turn are connected to a source of electrical current. A series of the panel-type structures shown in FIGURE 1 may be mounted on a ceiling or floor surface and connected by common cold wires to the current source.

The carrier preferably consists of fiberglass strands 12 and 14 treated with polyvinyl chloride, such as plastisol, either before or after the heating element wire has been applied thereto, the plastisol being applied primarily for the purpose of maintaining the fiberglass in the proper mesh form and preventing fraying of the fiberglass. The electric heating element wire is placed on the fiberglass mesh material in the desired configuration, and a heating element, such as a hot plate of suitable size, is pressed on the superposed heating element wire, and the wire and fiberglass structure heated sufficiently by the heating element to cause the insulation 22 of the wire to flow partially around the fiberglass strands contacted by the wire. The manner in which the insulating material flows around the fiberglass strands is illustrated in FIGURES 3 and 4, wherein the strands are shown substantially enclosed or embraced at the points of contact by the insulating material of the wire. A somewhat thicker layer of insulating material than normal is preferably used on the wire to assure a firm joint between the carrier strands and insulated

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wire and also to provide adequate insulation on the wire at the joints between the wire and carrier. It is not necessary for the insulating material to completely enclose the strands, but rather that it extend around the strands sufficiently to, in effect, lock the strands in the slot created thereby, the locking effect being produced by the flow of insulating material at points 32 and 34 inwardly toward one another sufficiently to form a restricted slot 36 in which the strands are firmly held. This construction produces a rugged structure which can be handled, shipped and applied to the ceiling or floor structure without the heating wire being displaced or the structure otherwise damaged.

After the heating wire and carrier have been assembled and secured to one another, as shown in FIGURES 3 and 4, the composite structure is treated with a sizing compound or primer of such composition that it becomes fully dry and non-tacky so that the structure can be handled and shipped without the contacting parts of the structure adhering to one another. A suitable material for this purpose consists of a nitrile base adhesive readily available on the market. After the nitrile material, for example, has been applied to the material and permitted to set, a composite structure can then be rolled or folded and prepared for shipment.

When an installation is to be made using the foregoing composite structure, the surface of the masonry or plaster sublayer 38 of the ceiling or floor is coated with a layer of adhesive material, such as liquid neoprene base adhesive and, while the layer is still tacky, the composite heating structure with the previously applied primer is pressed against the coated surface. As soon as the composite structure comes in contact with the tacky adhesive material, the primer or sizing agent on the composite structure is reactivated, causing the structure to adhere to the surface. After the adhesive has set and become dry, the composite structure adheres firmly to the ceiling surface. The type of material mentioned herein does not interfere with the subsequent application of a layer of plaster, cement, heavy base paint or other similar materials for enclosing the heating structure. FIGURE 5 illustrates the installation of the heating structure on the ceiling with the wires 16 on the upper side of the carrier and FIGURE 6 illustrates the installation with the wire on the underside of the carrier, the latter arrangement being preferred, particularly when an external coat or layer 40 is applied to the ceiling surface to enclose the heating element, since this arrangement minimizes the formation of air pockets in and around the wire, which may sometimes occur in the arrangement shown in FIGURE 5.

Various types of adhesives may be used, including primarily the rubber base type adhesives. The principal requirements for these materials are that the sizing agent or primer can be applied to the heating structure and permitted to set so that it will not interfere with handling and shipping of the heating structure and that the adhesive

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material will react with the sizing agent or primer after the adhesive has been applied to the ceiling to produce an effective bond between these materials to secure the heating structure to the ceiling. Another requirement for the adhesive and primer is the non-interference with the application of the external or final layer 40 of the ceiling.

It is seen from the foregoing description that the carrier may be of various shapes and sizes, and the heating element wire may be placed thereon in any desired configuration to satisfy requirements. After the heating structure has been assembled, it can be applied directly to the ceiling after the adhesive material has been applied thereto and easily folded or pressed into various configurations to conform to the contour of the wall, including corners, beams, and pipes and conduits to completely enclose these structures with a satisfactory electrical heating system.

While only one specific embodiment of the present invention has been described in detail herein, various changes in the structure and materials used therein can be made without departing from the scope of the invention.

I claim:

1. A method of producing a heating structure having sections of resistance wire, comprising coating said wire with a thick layer of thermoplastic insulating material, mounting said wire in a predetermined pattern on a carrier of coarse meshed strands, pressing the insulating material of said wire on said carrier until said material substantially embraces the strands at the points of contact therewith, coating said carrier and insulated wire with an adhesive primer, coating the surface to which the heating structure is to be applied with a tacky adhesive, and pressing said carrier and said insulated wire against the adhesively coated surface.

2. A method of installing a heating structure consisting of sections of resistance wire, comprising coating said wire with a thick layer of insulating material, mounting said wire in a predetermined pattern on a carrier, pressing the insulating material of said wire on said carrier to secure the wire to the carrier, coating said carrier and insulated wire with an adhesive primer, coating the surface to which the heating structure is to be applied with a tacky adhesive, and pressing said carrier against the adhesively coated surface.

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