

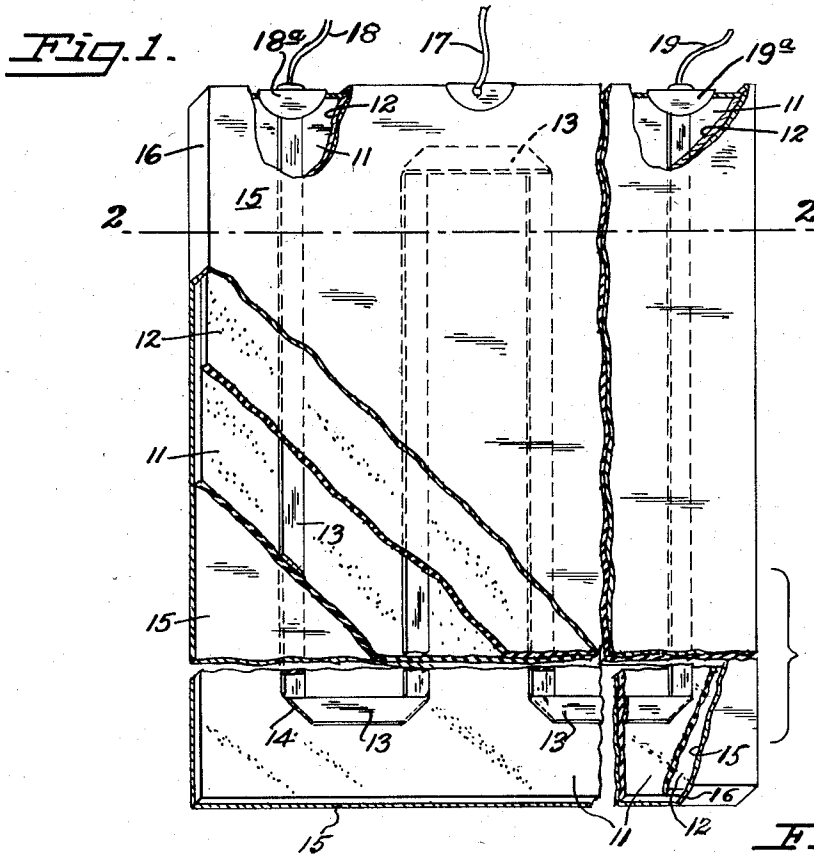
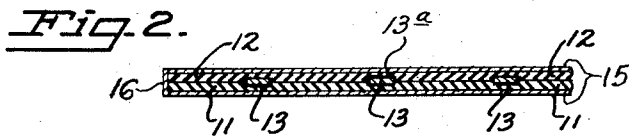
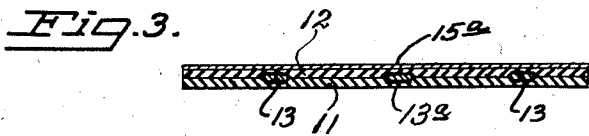
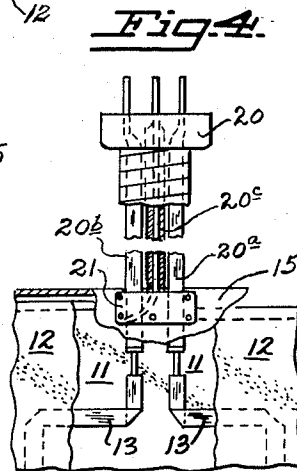
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ELECTRICAL FLOOR HEATING PAD

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1

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ELECTRICAL FLOOR HEATING PAD

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This invention relates to electric floor heaters and more particularly to such heaters which may be placed under or integrally built into a rug or carpet without danger of igniting or charring wood, paper or cloth, nor give a person an electric shock by contact.

The heating of rooms by various means introduced into the floor is becoming more and more an accepted and desirable manner of heating because it keeps the floor warm and gives off heat over such a large area that the actual temperature at the floor surface may be very low or at very little higher temperature than is desired for the stratum of air in which a person's body is normally positioned between floor and ceiling, or what is commonly called the breathing stratum. On the other hand, heating by convection or radiation usually requires a very high temperature at the immediate vicinity of the source of such heat in order to reach the more remote portions of a room, and the highly heated air promptly rises to form a hot pocket adjacent the ceiling whereas the breathing stratum and the space adjacent the floor may remain relatively uncomfortably cool. It is desirable that a more uniform, and possibly moderate temperature should exist throughout the entire cubic volume of a room.

The invention contemplates a floor pad having a heating unit fusible at relatively low temperature. In order to obtain the maximum of efficiency from the pad there should be as little material as practicable overlying the pad since substantially all body material is thermally insulating in varying degrees. It is also highly desirable that electrically heated pads operate on the usual current present in a house, 110 v. or 220 v.

Briefly described, the invention herein comprises a relatively thin pad electrically heated and grounded, the thickness of which should not be visibly noticeable nor appreciably felt underfoot except as a normal pad under a rug or carpet. The pad has two sheets of electrical insulation material and an electrical resistance element therebetween which is electrically fusible to break the current at a relatively low temperature which would not be sufficient to ignite or char mediumly inflammable material such as wood, paper or cloth. An electrical conductive sheet overlies the normally exposed face of the layer of electrical insulation material, or if the heating pad is to be free for removal and replacement under a rug or carpet, then both exposed or outer faces of the insulation material are encased in such electrical conductive sheeting, the electrically conductive sheet or sheets being for grounding in a well known manner to proper metal grounds such as pipes or plumbing facilities. Obviously the heating element has means for connection to a source of electrical current in any usual manner.

One form in which the invention may be exemplified is more particularly described herein and illustrated in the accompanying drawing in which:

Fig. 1 is a fragmentary broken perspective view of a portion of the pad of the invention, including the

2

necessary connections and having sheets thereof broken away to show various underlying layers.

Fig. 2 is a fragmentary lateral transverse section through a portion of the pad of Fig. 1.

Fig. 3 is a fragmentary lateral transverse sectional view of a modified form of the pad of the invention.

Fig. 4 is a fragmentary planar view of a modified form of electrical connections to the pad.

Referring to the drawing in which like reference characters indicate corresponding parts in the several views, Figs. 1 and 2 are illustrative of a form of the invention which may from time to time be removed from and replaced on a floor under a rug and therefore has an electrical ground at both opposite outer faces, and in which 11 is a sheet of electrical insulation material, while 12 is a second or overlying sheet of electrical insulation material in facial contact with the underlying insulation sheet 11. These sheets of electrical insulation material 11 and 12 may be of any suitable readily flexible electrically insulating substance which has sufficient rebound resiliency to inherently resume its planar form when depressions are temporarily made therein in use as a floor rug, and for economy and efficiency it has been demonstrated that sheets of substantially odorless ordinary commercial tar-impregnated felt roofing paper of approximately fifteen pounds per 100 square feet is efficient and economical for insulation purposes, since the tar element renders it impervious to penetration of moisture, and it is sufficiently resistant to wear and sufficiently strong in texture due to the felted or fibrously toughened character of such paper.

Between the two sheets of electrical insulation material is an electrical resistance heating element 13 of low fusing or melting characteristics, such as having the quality of fusing at a temperature insufficient to superficially burn readily inflammable materials such as wood, paper or cloth to an appreciable damaging content. The range of fusibility may vary quite widely, but for practical purposes an element that will fuse within the range of 200° and 400° F. is preferred. The heating element 13 is preferably relatively thin, flexible, narrow ribbon strips of electrically conductive resistance material arranged in any suitable zig-zag form or may be a geometrical regular pattern by folding it upon itself at corners or angles as at 14. There may be one or more circuits of such material running in parallel from a single switch, or from more than one switch in order to accomplish the well-known high and low heats, as is common in various heating devices. A satisfactory example of the heating element may be one-hundredth ($\frac{1}{100}$) of an inch in thickness and three-sixteenths ($\frac{3}{16}$) of an inch wide; and an example of its constituents for fusibility at relatively low temperature may be an alloy of equal portions of tin and lead, the constituents being standard commercial products. If desired a small quantity of bismuth may be added to the alloy to reduce the temperature at which it is meltable or fusible.

The ribbon strips of resistance elements 13 are preferably positioned on at least one of the tar paper sheets by an adhesive 13a, and are disposed in planar form between the planar faces of the two layers of insulation material which may be then sealed in intimate superficial contact with bitumen adhesive which may be incorporated in the body material of the insulation material per se and caused to adhere by heating.

In Figs. 1 and 2 the two sheets of insulation material, with the resistance element therebetween, have a thin flexible layer or sheet of electrically conductive grounded material 15 adhesively secured to both of the opposite outer faces thereof, and preferably encasing so as to be coextensive with the planar area of the insulation sheets at both faces and at the peripheral edges as at 16, provid-

ing an enclosing envelope. Where the pad is cemented at one face to a floor, usually an electrically ground coat on the exposed face is sufficient, such as shown at 15a in the modification of Fig. 3. Where the pad is maintained separate from the floor, as in case of loosely placing it under a rug or carpet, it is preferred that the electrically conductive ground layer be present at both faces of the pad, otherwise a person moving the pad for cleaning or in course of moving household goods from one location to another, might inadvertently place the electrically conductive layer at the bottom, whereas manifestly it should be uppermost since the possible contingency of any shock from the electric current would occur from the upper or exposed face.

The electrically conductive ground layer is preferably a thin flexible and pliable sheet of metal such as aluminum foil, a well known conventional product, the foil being adhesively secured in intimate facial contact to the outer faces of the insulation sheets by any suitable adhesive, preferably of a bitumen material which will bond with the bitumen in the tar of the insulation sheet. The conductive casing of metal foil has any suitable conductive means as at 17 for grounding it to any accessible electrical ground, such as to metal plumbing as is a common practice.

The heating element is connected in an electrical circuit which may be of 110 v. or 220 v., such connection being conventionally illustrated in Fig. 1 as conduits 18 and 19, the terminals of which may be insulated from the aluminum foil envelope by insulating clips or tabs 18a and 19a, which clamp to one or more layers of the body of the pad structure and thus put the strain or tension of a pull on the conduits directly on the pad body and not on the terminal end of the resistance unit which has only an adhesive bond to the sheets which enclose it.

Other well known facilities of conventional type may be employed in connection with the use of the heating pad in the same manner as with other electrical heating facilities, such as room thermostats, time clocks, etc. However, a simple inexpensive control of heat may be arranged by providing two separate heating elements 13 in parallel, one about twice the heating capacity of the other, and each connectible in circuit by a separate switch since by such simple arrangement either low, medium or high temperatures may be obtained and controlled.

The low fusibility of the heating element is a safeguard against fire hazards or any dangerous surge of electric current, and the grounding of the conductive foil is a safeguard against accidental shock to persons in the use of the pad.

A modified form of electrical connection is shown in Fig. 4 in which the electrical and ground conduits are bound in a single cable connected to a single wall plug 20, the electrical circuits 20a and 20b having an insulated coat entering between the insulation sheets 11 and 12 for connection of the circuit wire to the resistance element 13. The ground circuit 20c is connected to the exterior electrically ground envelope 15 by riveted clamp plate 21 which tightly clamps the ground conduit to the conductive sheet and also furnishes a tight binder means for the electric conduits directly to the body of the pad whereby tension of pull on the conduits is transmitted to the pad body and not to the resistance element, thus serving the same purpose in this respect as the clamps

18a and 19a in Fig. 1, a factor which has an important function in connection with a floor pad in which the resistance element is positioned within the pad by an adhesive, and the normal use of the pad on the floor subjects the electrical conduit to constant possibility of being caught or engaged by the vigorous thrust of a person's foot.

Having thus described the invention, what is claimed as new and patentable is:

1. An electrical heating pad including a pair of flexible moisture impervious electrical insulation sheet members overlying with faces opposed, a flexible electrical resistance element between the relatively opposed faces of the insulation sheet members and fusible at a temperature insufficient to superficially burn readily inflammable material, a sheet of electrically conductive material at each of the outer faces of the insulation sheet members, and an electrical ground means connected to both of said electrically conductive sheets, and means for connecting the resistance element in an electric circuit.

2. An electrical heating pad having the elements as set forth in claim 1 and in which the resistance elements are flexible ribbon strips having a relative wide planar face compared with the thickness thereof, and a clamping means adapted for engaging the conduit means and the body of the pad whereby tension of pull on said electrical conduit is transmitted to the body of the pad.

3. A pad for electrical heating including a pair of flexible moisture impervious electrical insulation sheet members impregnated with a fibrously toughening material and having sufficient inherent rebounding resilience to resume a planar form when dented, said insulating sheet members being overlying with faces opposed and having the opposed faces adhesively connected, a relatively flat flexible ribbon strip of electrical resistance element between the relative opposed inner faces of the insulation sheet, said resistance element being fusible at a temperature insufficient to superficially burn readily inflammable material, means to connect the said resistance elements in an electric circuit, a flexible sheet of electrically conductive material overlying and coextensive with each of the opposite outer planar faces of the insulation sheet material and being adhesively connected thereto, and electrical conduit means for connecting said electrically conductive sheets to an electrical ground.

4. An electrical heater pad as set forth in claim 3 and in which the means for connecting the resistance elements in an electric circuit includes a clamping means adapted for engaging the electrical conduits and the body of the pad.

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