

Feb. 19, 1929.

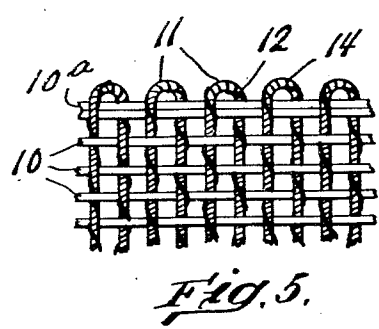
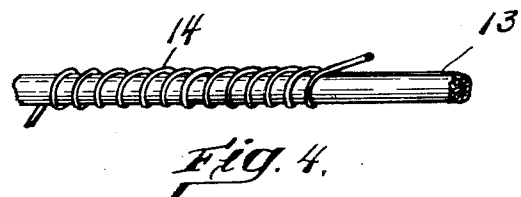
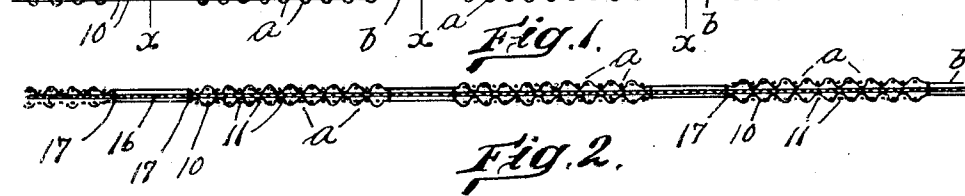
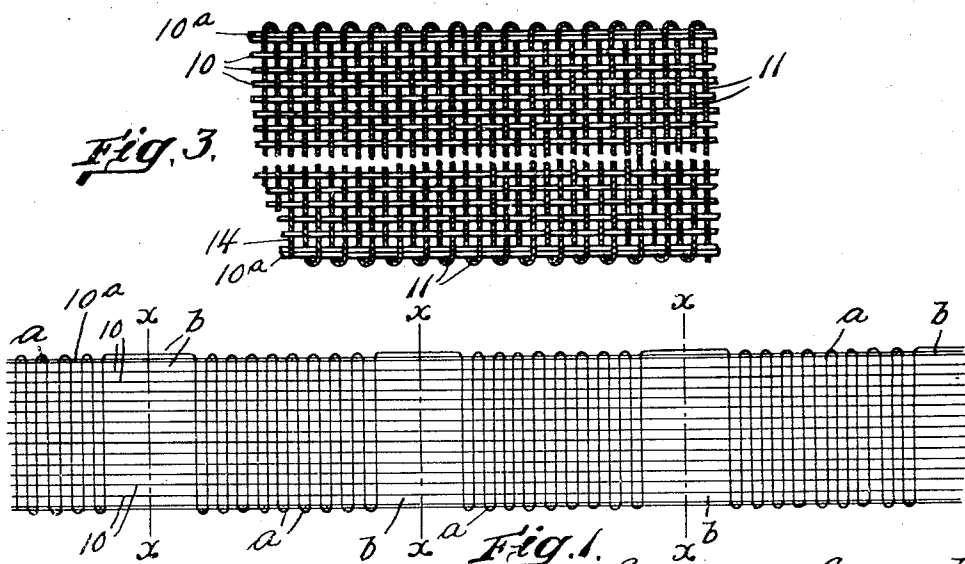
1,703,005

F. W. HEWITT

ELECTRIC HEATING PAD AND FABRIC

Filed Jan. 5, 1928

2 Sheets-Sheet 1



Inventor.
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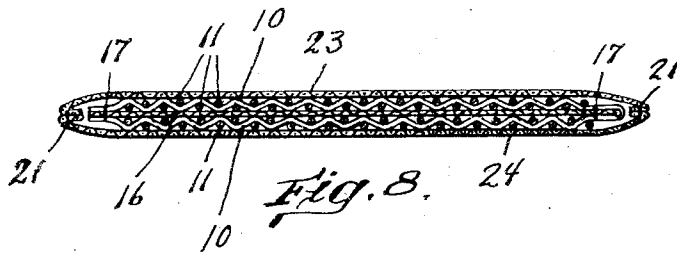
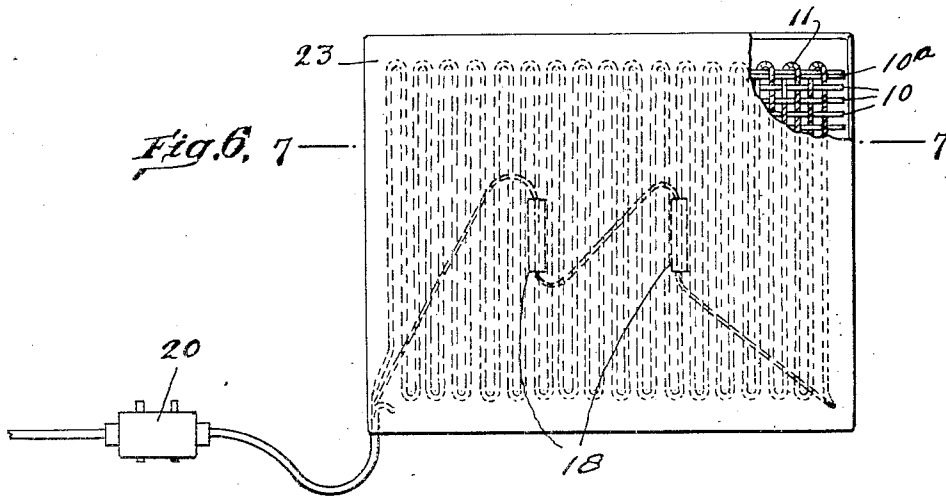
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ELECTRIC HEATING PAD AND FABRIC

Filed Jan. 5, 1928

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE.

FRANK W. HEWITT, OF ARLINGTON, MASSACHUSETTS.

ELECTRIC HEATING PAD AND FABRIC.

Application filed January 5, 1928. Serial No. 244,744.

This invention relates to flexible electric heating pads and the like wherein a resistance wire is disposed on and is supported by a flexible fabric in such a manner as to provide a flexible construction and to distribute heat approximately uniformly over the surfaces of the pad.

Heating pads of the type above set forth have usually contained a relatively high resistance wire as the heating element, which wire may be in the form of a spiral or coil; and the wire is usually contained in a heat insulating sheath and has only a relatively few folds.

It is an object of this invention to provide a flexible electric heating pad consisting of a flexible woven fabric having warp strands of textile fibres and having the woof consisting of a continuous strand of fibrous material wound with a spirally-formed continuous electric conductor of low resistance, which conductor is without a heat-insulating sheath and is exposed for free heat radiation and convection from its surface.

A further object of the invention is the provision of an electric heating pad having its opposite covers, or faces, formed of materials having different heat-conducting properties, whereby different degrees of heat may be obtained merely by placing one or the other side of the pad in contact with the body to receive heat.

A further object is generally to improve the construction of electric heating pads.

A yet further object is an improved method of manufacturing electric heating pads.

Fig. 1 is a plan detail illustrating the manner of making the heating fabric embodying the invention.

Fig. 2 is an enlarged side elevation of Fig. 1.

Fig. 3 is a fragmentary plan view of a woven heating fabric drawn approximately to full scale.

Fig. 4 is a detail of the heating element and illustrating more particularly the construction thereof.

Fig. 5 is an enlarged plan detail of a heating fabric adapted for use with a similar heating fabric having a heating element of a different resistance and wherein the heating element bears an identifying characteristic.

Fig. 6 is a plan view of a heating pad constructed in accordance with the invention

and with a portion of the external cover removed to expose a heating fabric.

Fig. 7 is a section along line 7—7 of Fig. 6 and illustrating more particularly the internal construction of the heating pad.

Fig. 8 is a section similar to Fig. 7 but illustrating a modified construction wherein the superimposed heating fabrics are formed from a continuous section of fabric.

As here shown the woven heating fabric embodying the invention comprises the textile strands 10 which form the warp of the fabric. Said warp strands may consist of cotton or other fibres; and the strands may be relatively widely spaced apart, say about one-eighth of an inch, or as illustrated in Fig. 2. The warp at the edges of the fabric may have a double strand, as at 10^a, whereby to provide increased strength at the side edges. The woof of the fabric comprises a heating element 11, and the warp and the woof may be woven in any suitable manner, as to form a simple basket-weave, as shown. The heating element, or woof, is continuous and is woven with the warp in such a manner that the warp strands hold the adjacent folds or strands of the heating element in spaced relation; and the spacing between the folds of the heating element may be about equal to the spacing between the warp strands.

The heating element may include a flexible core 13 of textile fibres, as cotton for instance. A continuous electrically conducting wire 14 is wound in a spiral manner over said core, to secure flexibility, and the convolutions of said wire are spaced from each other, whereby to provide free access of air to the surface of the convolutions. Preferably the heating element, comprising the wire and core, has a diameter about equal to that of the warp strands, whereby a uniform woven fabric may result. Said electric conductor is preferably of fine enamel-insulated copper wire, whereby to provide for a large extent of wire and, therefore, large heat dissipating surface although any other wire having similar characteristics may be used.

In the process of manufacture, the fabric is woven in long lengths sufficient to form a large number of smaller heating fabrics. The heating element, comprising the woof, is interwoven with the warp strands until a sufficient length of heating element is woven to produce a heating fabric having the desired characteristics, as power consumption, etc.,

whereupon the heating element is passed along the outside of the warp strands for a suitable distance and then again interwoven with the warp strands, and this process is repeated as desired. The long fabric is thus formed with woven sections *a* connected and separated by unwoven sections *b* occupied by warp strands 10 only, and this fabric is designed by me to be sold as a new article of manufacture. The woven sections may be separated, after the weaving operation, by cutting the warp strands in the unwoven portion along the line *x-x*, whereby to produce a plurality of heating fabrics having the same power consumption. Preferably, however, and particularly for heating pads having two heating elements or fabrics having different rates of power consumption, the procedure is different; and the preferred method is illustrated in Fig. 2. A long length of fabric woven as above set forth has superimposed upon it a suitable fabric supporting sheet 16. A second long length of heating fabric is superimposed upon the supporting fabric in such a manner that the woven portion *a* and unwoven portions *b* of the two heating fabrics are in vertical register. Spaced lines of stitching 17 are then passed through all of the sheets, in the unwoven portions of the heating fabrics; and the stitching serves to unite all the superimposed fabrics together and also to bind the warp strands of the heating fabrics in place. The united and superimposed fabrics may be cut between the lines of stitching, as at *x-x*, and each section, when the heating elements are properly connected electrically, is in readiness to be inserted in the covers of a heating pad. If the heating pad is designed, however, to have two heating fabrics of the same power consumption, I may cut the long fabric into short sections each containing two woven sections separated by unwoven warp strands, and fold the short section to superpose the woven sections as illustrated in Fig. 7; and the warp strands may be continuous throughout both upper and lower heating fabrics. If the heating pad is designed to have two heating fabrics having different rates of power consumption, I prefer to weave two sets of fabrics, similar to that illustrated in Fig. 1, but with different heating elements, and I may form one heating element with an identifying characteristic, as by weaving a colored thread 12 thereon, Fig. 5, whereby readily to identify the different heating fabrics.

The heating elements of the superposed heating fabrics may be connected to an electric circuit in any well known manner, and by suitable means as the switch 20, whereby to obtain a plurality of "heats." One or more thermostats 18, of more or less usual construction, may be disposed between or upon said superposed fabrics, to be heated by both fabrics, and included in the circuit through

the heating elements in a more or less common manner to protect said heating elements against an undue elevation of temperature.

The heating fabrics are adapted to be enclosed within an enclosing casing formed, preferably, of two sheets of material, or covers, having dissimilar heat-conducting characteristics and united together by suitable means as the lines of stitching 21. One sheet or cover, as the sheet 23, may have the property of being a relatively good heat conductor and the other sheet, as the sheet 24, may have the property of conducting heat at a slower rate than that of said first sheet. With this arrangement, when the cover 23 is in contact with the body to be heated, the effect of a "high heat" may be obtained, and when the cover 24 is in contact with the body, the effect of a lower "heat" may be obtained, and without altering the electric connections of the heating elements.

The connection of heating elements with the power circuit, under control of the switch 20, is adapted to be such that three different "heats" may be obtained. Since the covers 23 and 24 provide one additional "heat" with each circuit arrangement of the heating elements, as ordinarily but one side of the heating pad is used at one time the above described construction of the covers provides a pad having a total of six "heats."

The cover sheets 23 and 24 are preferably made of relatively soft and flexible materials. The cover sheet 23, for instance, may be made of suitably prepared cotton which permits heat to be conducted through it at a relatively rapid rate. The cover sheet 24 may be made of eiderdown, for instance, through which heat may be conducted at a slower rate.

It is to be noted that the weave of the heating fabrics and the relation of the fabrics and the cover-sheets is such that air pockets 26 are formed, in which air pockets the heating elements are disposed; and heat may be radiated from the heating conductor directly to the cover-sheets of the pad; and the air has free access to the surface of the heating elements and may circulate freely over the heated surface thereof and give up its heat to the cover-sheets, whereby to heat said cover-sheets uniformly over practically their entire extent.

I claim:

1. An electric heating pad including a flexible loosely woven heating fabric having a warp composed of strands of spaced textile fibres, and a homogeneous woof of continuous fibrous material wound with an exposed fine copper wire with the convolutions thereof spaced apart.

2. An electric heating pad including a flexible loosely woven heating fabric having a warp composed of strands of spaced textile fibres, and a homogeneous woof of continuous fibrous material wound with an exposed

fine copper wire with the convolutions thereof spaced apart, and a fabric enclosure for said heating fabric.

3. An electric heating pad having two layers of loosely woven heating fabric made as described in claim 1, stitched to an intervening supporting fabric.

4. An electric heating pad having two layers of loosely woven heating fabric made as described in claim 1, stitched to an intervening supporting fabric, and a fabric enclosure for said fabrics.

5. An electric heating pad having opposed heat-conducting faces, each composed of materials having different heat-conducting properties, and an electric heating element disposed between said opposed heat-conducting faces.

6. An electric heating pad having an electric heating element including means to provide a plurality of heats therefrom, and an enclosing casing for said heating element having opposed heat-conducting covers composed of materials having different heat-conducting properties.

7. An electric heating pad having a flexible loosely woven heating fabric made as described in claim 1 and enclosed in a flexible casing having two opposed cover-sheets constructed of materials having different heat-conducting properties.

8. An electric heating pad having two layers of loosely woven heating fabric made as described in claim 1 stitched to an intervening supporting fabric and all enclosed in a flexible casing having two opposed cover-sheets constructed of materials having different heat-conducting properties.

9. As a new article of manufacture, a flexi-

ble woven heating fabric comprising a plurality of spaced woven sections consisting of insulating warp strands and electrically conducting woof strands, the woven sections being connected by unwoven sections having warp strands only and being free from said electrically conducting woof strands.

10. The method of manufacturing an electric heating pad which consists in forming a length of flexible heating fabric having woven sections including an electric heating element, and intervening unwoven sections free from the heating element, applying a flexible textile supporting fabric to said heating fabric, to extend over said woven and unwoven sections, attaching said heating and supporting fabrics together along two spaced transverse lines located in the unwoven sections of the heating fabric, and cutting the attached fabrics between the lines of attachment.

11. The method of manufacturing electric heating pads which consists in forming two separate lengths of flexible heating fabric, each length having spaced woven sections including a heating element, and intervening unwoven sections, superposing said lengths of fabric with their woven and unwoven sections in vertical register and with a length of a flexible textile supporting fabric interposed between the heating fabrics, attaching all fabrics together along two spaced transverse lines located in the unwoven sections of the heating fabrics, and cutting said attached fabrics between the lines of attachment.

In testimony whereof, I have signed my name to this specification.

FRANK W. HEWITT.