Nov. 19, 1935. B. W. MACY 2,021,458

ELECTRICAL HEATING PAD

Filed Sept. 11, 1933

Fig. 1.

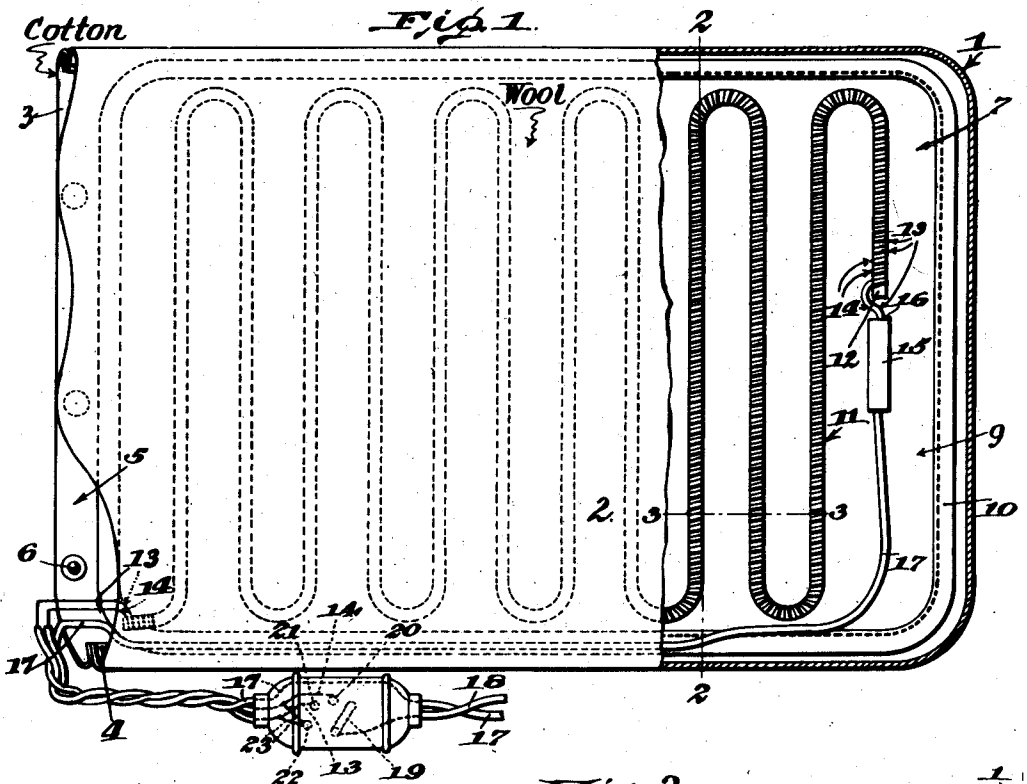


Fig. 2.

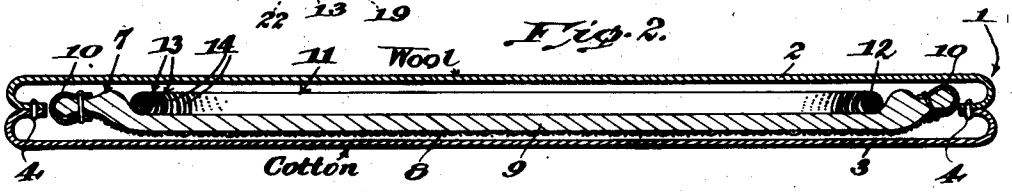


Fig. 3.

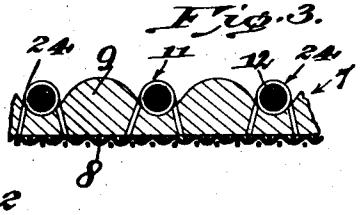
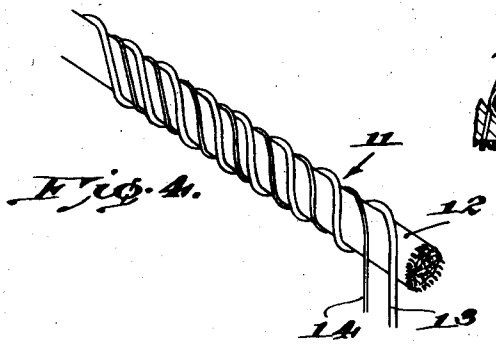


Fig. 4.



WITNESS

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ELECTRICAL HEATING PAD

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Application September 11, 1933, Serial No. 689,024

2 Claims. (Cl. 219—46)

This invention relates to improvements in electrical heating pads, and its objects are as follow:—

First, to provide a heating pad having a heating element in which the conductor wires are of exceptionally low resistance and consequently of large carrying capacity in proportion to their size, with the result that they do not heat to any perceptible degree excepting when contacted by some object capable of absorbing the heat.

Second, to combine a heating element and a woolen bag panel for the purpose of abstracting moisture from the surrounding air and so providing a moist heat with all of its therapeutic value, the maximum operating temperature of said element being below the point required to drive off moisture, and the woolen panel having the property of accumulating moisture.

Third, to provide a heating pad in which the current can be left on indefinitely when once turned on, this by reason of the conductor wires of the heating element having an ample capacity for dissipating their respective wattages, said element having a thermostat solely for the purpose of shutting off the current and thus acting as a safety device when there is nothing to take the heat away, the thermostat acting for example, when the pad is accidentally folded over on itself.

Fourth, to make the heating element instantly accessible for inspection and repair, this being accomplished by attaching the element on one side of the fabric base without any covering therefor excepting the bag in which the base is inserted.

Fifth, to utilize wires of very flexible material, the flexibility of the wire enduring because the tendency toward crystalization is reduced by virtue of never heating the wires to a high temperature and then suddenly cooling which causes crystalization.

Sixth, to embed the heating element in a felted base so as to make the pad more comfortable to the user and to eliminate the chance of the turns of said element coming together.

Other objects and advantages will appear in the following specification, reference being had to the accompanying drawing in which,

Figure 1 is a plan view of the improved heating pad, a part of the bag being broken away and shown in section in order to reveal the fabric base and heating element.

Figure 2 is a cross section taken on the line 2—2 of Figure 1.

Figure 3 is a detail section taken on the line 3—3 of Figure 1, particularly showing how the heating element is embedded in the fabric base.

Figure 4 is a detail perspective view of a portion of the heating element.

In carrying out the invention provision is made of a bag 1 which comprises a woolen panel 2 and a cotton panel 3. These panels are sewed together at 4 around two sides and one end of the bag, the remaining end being left open at 5 for the insertion and removal of the fabric base. The opening 5 is closeable by snap fasteners 6.

The purpose of making the panel 2 of wool is to take advantage of the property of wool to accumulate moisture from the atmosphere to a more noticeable degree than other materials. This property is of value because in the operation of the pad a moist heat will be applied to the body. This is important because of its therapeutic value, it being well known that a moist heat is far better for certain physical ailments than a dry heat. In practice both panels may be made of wool, but the combination of wool and cotton is usually preferred because of the lower cost of cotton material.

A base 7 is inserted in the bag 1. This is a fabric base. It comprises a bottom portion 8 of burlap or other strong material. This is covered on one side with cotton felting 9. The cotton felting is soft and is particularly suitable as one of the plies of the two-ply base. The two plies are sewed together by parallel rows of stitching (not shown), these being applied close together so as to intimately combine the bottom portion 8 and the cotton felting 9. The edges are finished by the binding 10 which prevents ravelling.

The heating element 11 (Fig. 4) comprises a cotton or similar core 12. This core is not required to consist of asbestos because the heating element is never raised to a kindling temperature. Two conductor wires 13, 14 are wrapped on the core 12 in helical form. The wires run parallel to each other. There is a sufficient space between the adjacent wires to prevent short circuiting anywhere in the length of the heating element.

These wires are composed of a material of exceptionally low resistance. By virtue of that fact they have a large current carrying capacity in proportion to their size. As compared with wires customarily used in heating pads, the wires 13, 14 have a resistance from 200 to 275 ohms per mil foot as against approximately 660 ohms per mil foot in the wires of known heating pads.

The wires 13, 14 are very flexible, and they stay flexible because there is no alternating heat-

ing and cooling of the element 11 in the operation of the pad, it being the cooling of the wire in known pads that causes crystalization, the loss of flexibility and eventually irreparable breakage.

A thermostat 15 of any conventional manufacture is connected to the joined wires 13, 14 at the point 16, the current being supplied by one of a pair of line wires 17, 18. The other one of this pair is connected to a movable switch arm 19 in a switch of any known construction. This switch has three points 20, 21 and 22.

The point 20 has the fine wire 14 connected to it, and consequently when 19 is engaged with 20 the pad will be in operation for low heat. The heavier wire 13 is connected to the point 21, and when 19 is contacted with 21 the pad will be operated at intermediate heat. The point 22 has both wires connected to it as at 23, consequently when 19 is contacted with 22 both wires will be energized and the pad operated at high heat.

Attention is directed to Figure 3. The heating element 11 is sewed or otherwise attached to the cotton felting 9 as at 24. The attachment is made under pressure so that the heating element is embedded in the cotton felting substantially as shown, and perhaps even more so. This embedding brings the crowns of the exposed parts of the heating element substantially flush with the adjacent top surface of the cotton felting 9 and prevents the element from standing out as so many ridges throughout its turns which ridges would make the pad uncomfortable. The embedding of the element also insures keeping the turns apart so that there will be no chance of a short circuit.

The operation is readily understood. The switch arm 19 is movable to any one of its positions just as any ordinary switch of this type, but the action of the pad itself is entirely dissimilar to known heating pads. First of all it is important to note the combination of the woolen panel 2 with the heating element 11.

These parts come next to each other as seen in Figure 2. The woolen panel has the property of accumulating moisture from the surrounding air, this property being augmented by the fact that the temperature of the heat is never raised to a sufficiently high degree that will drive off moisture. In fact the maximum operating temperature is so low that a person who applies his tongue to a part of the element while energized will not be conscious of any discomfort.

But when any substantial area of the heating element is covered, for example by the hand or by applying the pad to the human body, there is an immediate concentration of heat at one or the other place, and since the heat is conducted off into the body from the heating element the same effect is had as though the wire were of the customary high resistance and subject to heating to an extremely high temperature.

Now it follows from the relatively low maximum operating temperature of the heating element 11 that the woolen panel 2 can perform its function of accumulating moisture from the air and of applying that moisture to the human body. The therapeutic value of this has been touched upon before, and is generally acknowledged as giving an ordinary hot water bag preference for some types of physical ailments over known electrical heating pads.

It is intended that the current will be left on for an indefinite period when once turned on. Of course the period would be limited by the time of use of the pad. But no matter how long the current is left on the wires 13, 14 will continuously dissipate their heat without even reaching a dangerous temperature. With this in mind it will be understood that the thermostat 15 is not for the purpose of perpetually opening and closing the circuit according to prevailing method in known heating pads. The thermostat 15 is solely an emergency unit or safety device.

Should the pad become inadvertently rolled up or so confined in such a way that the heat cannot be conducted away from the element rapidly enough to prevent a dangerous rise in temperature, the thermostat will then operate to open the electrical circuit. The thermostat is set to so operate at approximately 125° F. which is below the kindling temperature of the fabrics involved.

The high conductivity of the wires 13, 14 is responsible for enabling the washing of the inside part of the pad even with the current on. The reason for this is that the wire will conduct the current away more rapidly than it would short circuit between turns of the wire across the wet surface of the core 12. The advantage of enabling washing the pad with the current on, or of turning the current on immediately after washing, is that the pad can be dried out very rapidly.

The exceptionally high conductivity of the wires also accounts for a good percentage of inductance between the turns of the wire. The inductive action on the intermediate wet places aids in drying out the wetness. This is due to the fact that the water has a resistance to the passage of the induced current, and since it resists such passage enough heat is set up to aid in drying out the wetness. The induced current is also beneficial to the human body.

I claim:—

1. An electrical heating pad comprising a heating element of low resistance and a core on which the element is wound, said element having means by which current is conducted to and from it, a base into one side of which the core and element are sunk so that the core and element are substantially embedded in the base and the crowns of the element are exposed, and a bag by which the base is loosely contained so that the adjacent side of the bag and the base can shift relatively to each other to some extent.

2. An electrical heating pad comprising a heating element of low resistance and a core on which the element is wound, said element having means by which current is conducted to and from it, a base to which the core is applied so that the nearest parts of the element contact the base and the remaining parts of the element are exposed, and a bag by which the base is contained, the crowns of said exposed parts being separated from the outside air only by the thickness of the adjacent side of the bag, said base including a layer of felting in which the core is deeply embedded so that the crowns of the exposed heating element portions are substantially flush with the top surface of said felting.

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