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May 6, 1941. R. J. FITZ MAURICE 2,240,625

HEATING PAD

Filed Nov. 29, 1939

Fig. 1.

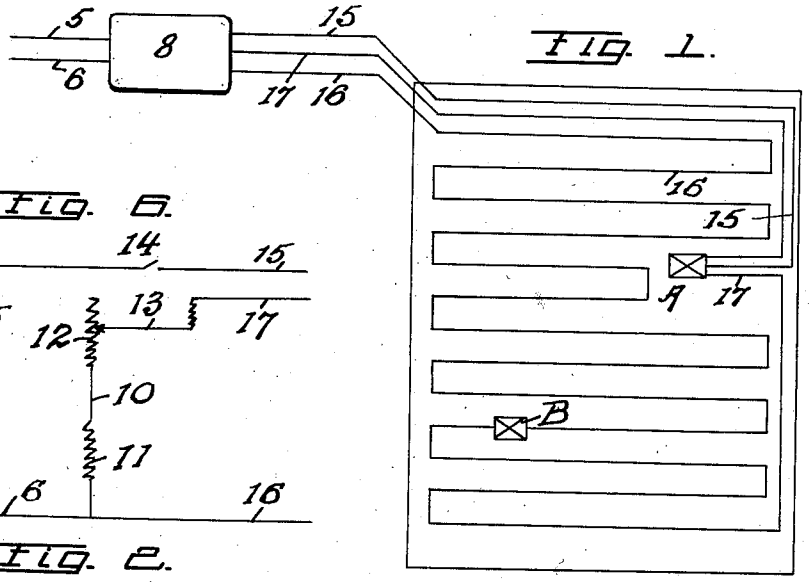


Fig. 6.

Fig. 2.

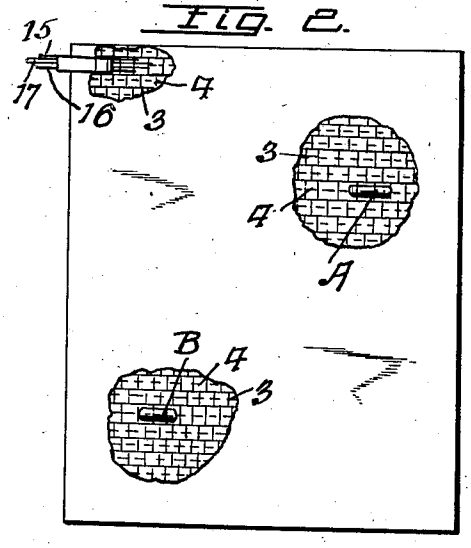


Fig. 5.

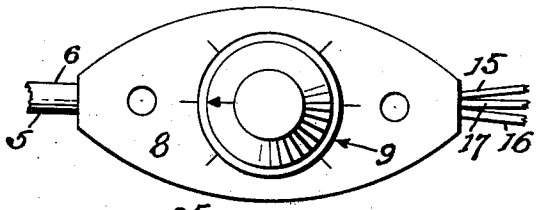


Fig. 7.

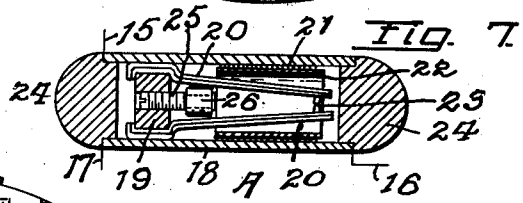


Fig. 4.

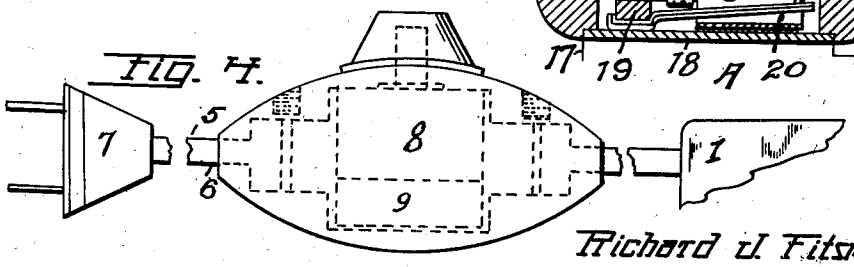
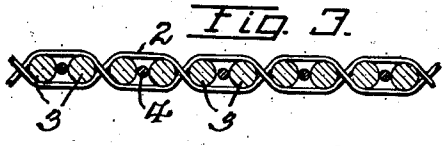


Fig. 3.



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2,240,625

HEATING PAD

Richard J. Fitz Maurice, Orange, N. J.

Application November 29, 1939, Serial No. 306,761

3 Claims. (Cl. 219—46)

This invention is directed to an improvement in heating pads wherein the pad proper is made up of woven material, with the heating wires intertwisted with certain of the woof threads, and wherein means are provided to manually control the maximum quantity of heat in the pad, together with the provision of means for automatically limiting the temperature of the pad.

The primary object of the present invention is the provision of a heating pad to be electrically heated, with the heating wires interwoven with certain of the woof threads to insure stable and accurate positioning of the heated wires with the result of maintaining an equal distribution of the heat.

A further object of the invention is the provision of control means located between the source of current and the pad by which the initial heat generated by the wires in the pad is manually controlled to afford a maximum limit; the control including an automatically responsive thermostat, located in and forming a part of the woof threads of the pad, through the use of which overheating is automatically prevented.

A further object of the invention is the provision of a pad having a substantially smooth comfortable exterior surface and having a thickness such that the provision of the thermostat within the pad proper presents no material projection beyond the normal surface of the pad to interfere with the comfort of the user.

The invention is illustrated in the accompanying drawing, in which:

Figure 1 is a general view of the wiring diagram of the pad and connections.

Figure 2 is a broken out view of the pad showing particularly the asbestos strands and the placement of the respective thermostats in such strands.

Figure 3 is a broken longitudinal section on an enlarged scale showing the relation of the wires and the asbestos strands in making up the pad.

Figure 4 is a side view of the manually operable current control.

Figure 5 is a plan of the same.

Figure 6 is a diagrammatic view of the current control circuit.

Figure 7 is a view in elevation with the casing in outline of the electrically adjustable thermostat.

The pad 1 is made up of more or less conventional warp threads 2 and asbestos woof threads 3. Each woof thread includes a pair of asbestos threads between which is arranged the heating conductor 4 of the pad which, in its application as a part of the woof thread, is intertwisted with ordinary cotton or linen thread and disposed between the asbestos threads making up a single woof strand.

As will later appear, there is embedded in the pad during the weaving thereof an adjustable thermostat and a fixed resistance, and in order that these elements, which of course, must have an appreciable diameter to accommodate the working parts, do not project uncomfortably from the surface of the pad, it will be noted that the asbestos strands or threads are of very considerable diameter as compared with that of the conductor and intertwisted thread and that the diameter of these asbestos threads approximates somewhat the diameter of the adjustable electrical thermostat and the resistor. Under these circumstances, the pad, which is made up of a single layer, will permit the thermostat and resistor to be embedded between the asbestos threads and present, when so embedded, relatively slight projection beyond the opposite surfaces of the pad proper and thus avoid any uncomfortable effect upon the user incident to the presence of these elements.

The heating conductor, as will later appear, is interwoven in the pad by being intertwisted with a woof thread. It is, of course, to be understood that certain only of the woof threads carry the conducting wires and that by this means the conducting or heating wire is held in fixed relation in the pad and the various convolutions or lengths of this conducting wire are, by the means described, held in such spaced relation one with the other that the possibility of short-circuiting or other interruption through contact of the conducting wire sections is impossible.

The heating conductors include service wires 5 and 6 leading from a conventional connector 7 adapted to be inserted in a conventional socket. These conductors lead through what may be termed a comfort control rheostat which includes a casing 8 and a rotatable member 9 cooperating with a portion of the circuit and designed for manual operation. The circuit within the comfort control rheostat includes a conductor 10 connected to the main conductor 6 and including a fixed carbon resistor 11 of approximately 10,000 ohms in series with a carbon resistor 12 having a limit of 50,000 ohms and acting as a variable resistor through a contact 13 controlled by the manually operable element 9. It will, of course, be appreciated that the exact values here suggested are not necessarily controlling, and that it is to be understood that, fundamentally, the network of resistances which include the winding within the variable thermostat, the manual variable resistance and the fixed resistance, would be so balanced that sufficient heat is delivered to the heat coil of the thermostat to cause it to regulate the temperature of the pad between the maximum and minimum.

A closing switch 14 for the main circuit is arranged, for example, in the conductor 5 and

adapted to be controlled by the manually operable element 9. This switch 14 may be closed as the manually operable element 9 is turned beyond the maximum resistant end of the resistance 12. Obviously, the switch 14 is closed and the resistance 12 regulated through the operation of the manually operable element 9 of the casing to move the arm 13 for variable control of the temperature in the pad, as will be later described.

Under this arrangement, three specific leads extend beyond the comfort control rheostat and are indicated more particularly as 15, 16 and 17.

Of course, the rotating member 9 may indicate its predetermined position under manual manipulation by appropriate cooperating markings of any kind or character on the case and on the rotating cap. The character and detail of these markings is unimportant and is not illustrated, except as lines in Figure 5, being entirely conventional.

In connection with the pad, there is provided what will be termed an adjustable thermostat, indicated more particularly in Figure 7, which has been previously referred to and which forms the subject-matter of a copending application to another. In this thermostat, which is indicated generally at A, is provided a casing 18 having a block 19 at one end which supports bi-metallic thermostatic arms 20 extending within a coil 21 carried on an insulating tube 22. The conductors 15, 16 and 17 lead into the casing to such extending lengthwise thermostatic arms to energize contacts 23 on said arms. The ends of the casing 18 are closed by caps 24 which are rounded to prevent angular projection above the surface of the pad. The arms 20 are adjusted through a conical wedge 26 and an adjusting screw 25.

The conductors 15, 16 and 17 are led into the pad, preferably at one corner thereof, and embedded within the pad in the manner described. The heating conductor 17 is carried beyond the thermostat A and embedded in the pad according to the description in connection with Figure 3. At an appropriate point in the length of this conductor 16, there is provided, embedded in the pad, a fixed thermostat, indicated at B in Figure 1. This is a conventional protective thermostat in order to provide an absolute limit in temperature during the heating of the pad.

Both thermostats A and B, being arranged as in effect a part of a heating conductor, are designed with that heating conductor or conductors to be embedded between the surface sections of the pad and to be woven into a section as a part of the particular woof thread in that section of the pad where they are located. As the thermostat A is an adjustable thermostat, its adjustment obviously controls the passage of the current to the pad, cutting out at the maximum heat condition for which it is set and restoring connections when the temperature condition of the pad falls below the selected cut-out degree.

It is to be understood that the pad, and particularly the woof material thereof, is made up of good heat conducting material capable of withstanding temperatures of approximately 400° Fahrenheit without strength impairment; that the heating element proper within the pad is in a continuous series circuit; and that all connections are made during the weaving process and embedded in the woof material.

It is, of course, to be understood that the pad is of a single thickness and that the thermostats A and B, when embedded in the asbestos strands, present but slight projection beyond the respective surfaces of the completed pad. As the casings of these respective thermostats are of circular elongated form, it is apparent that whatever projection beyond the normal surface of the pad may result from the use of the rheostats, it follows as a matter of course that no uncomfortable or really noticeable projection is present by the arrangement described which will in any manner tend to an inconvenience to the user.

What is claimed to be new is:

1. A heating pad having a pad proper of woven material, the woof threads being substantially of asbestos, an adjustable thermostat woven into the pad between the asbestos threads, a fixed thermostat woven into the pad between the asbestos threads, the heating conductor in series with the thermostats being embedded in the pad between the asbestos woof threads, the thickness of the woof threads approaching the diameter of the thermostats in order to avoid undue projection of the thermostats beyond the respective surfaces of the pad.

2. A heating pad having a manually operable current control between the pad and the source of current, the service conductors including resistance elements whereby the temperature producing effect of the manual current control is governed through the adjustment of a heating conductor with respect to the resistance elements, an electrical adjustable thermostat woven into the pad and set for a predetermined temperature control to which thermostat all wires leading from the manual current control are connected, the heating conductor being directed in series from the electrical adjustable thermostat and embedded between the threads of the pad in the weaving thereof, said heating conductor leading through a fixed thermostat within the pad to act as a maximum temperature control, the diameter of the embedded thermostats and the thickness of the threads of the pad having such relation as to prevent uncomfortable projection of the thermostats beyond the surface of the pad.

3. A heating pad having a manually operable current control between the pad and the source of current, the service conductors including resistance elements whereby the temperature producing effect of the manual current control is governed through the adjustment of a heating conductor with respect to the resistance elements, an electrical adjustable thermostat woven into the pad and set for a predetermined temperature control to which thermostat all wires leading from the manual current control are connected, the heating conductor being directed in series from the electrical adjustable thermostat and embedded between the threads of the pad in the weaving thereof, said heating conductor leading through a fixed thermostat within the pad to act as a maximum temperature control, the pad being made up of woof threads of heat resistant material having a diameter approaching that of the embedded thermostats, with the conductor wire intertwisted with appropriate fabric wholly embedded in the pad between the asbestos threads.

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