

1,416,481.

A. LONGORIA.
ELECTRIC HEATING PAD.
APPLICATION FILED FEB. 18, 1920.

Patented May 16, 1922.

2 SHEETS—SHEET 1.

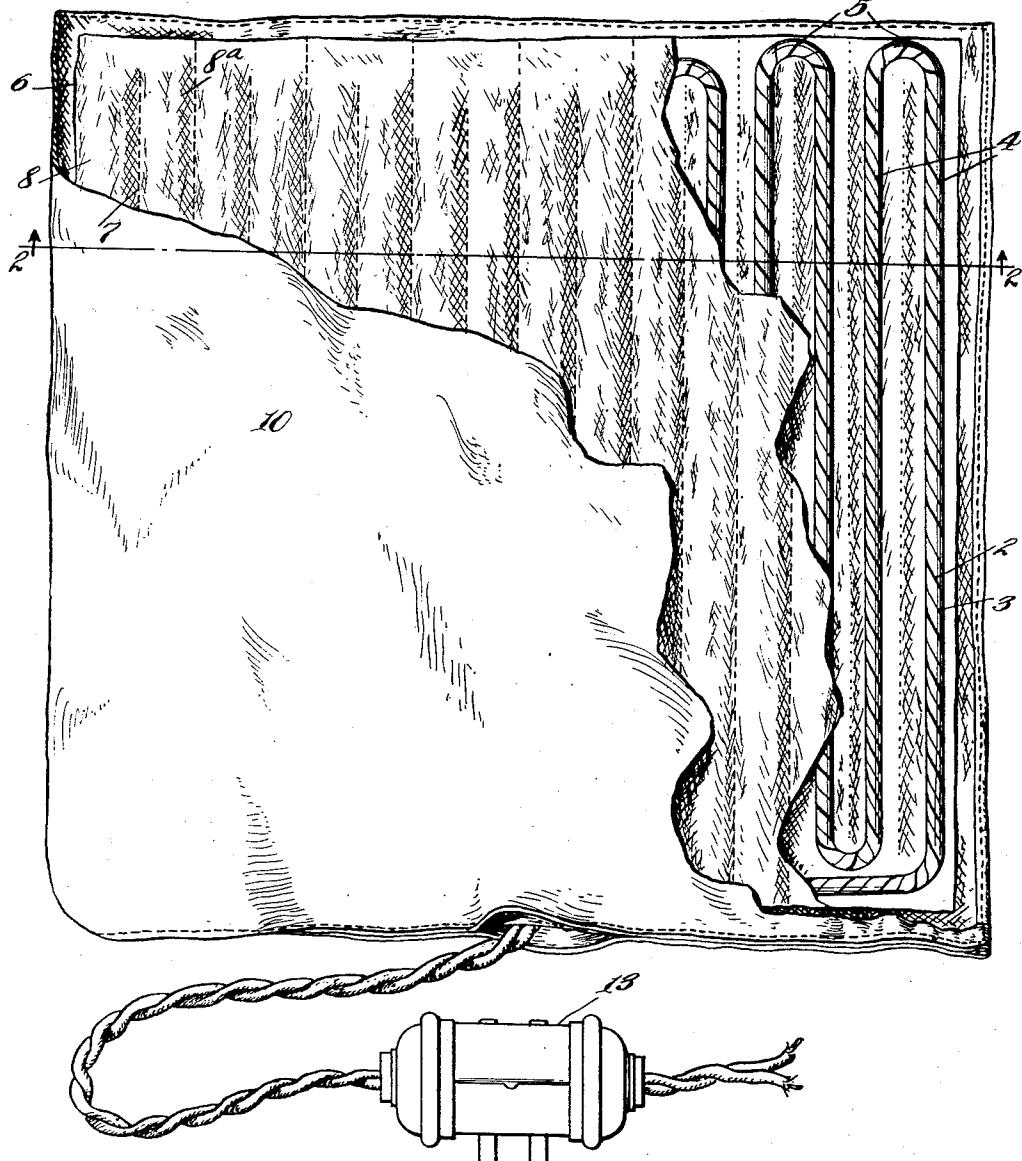


FIG. I.

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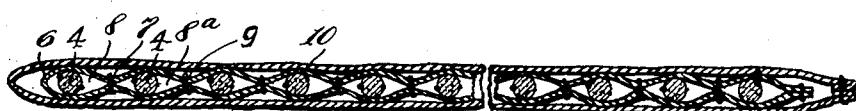
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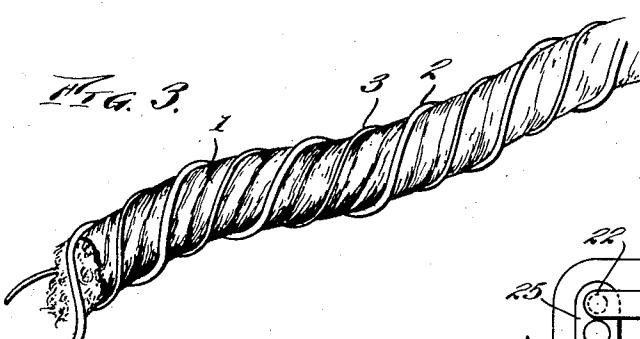
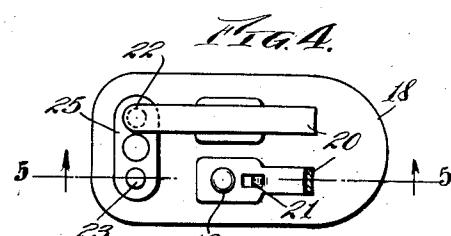


FIG. 3.



REG. A.

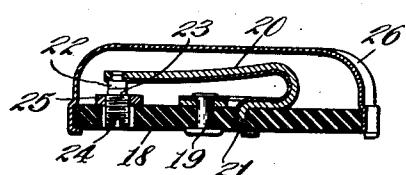
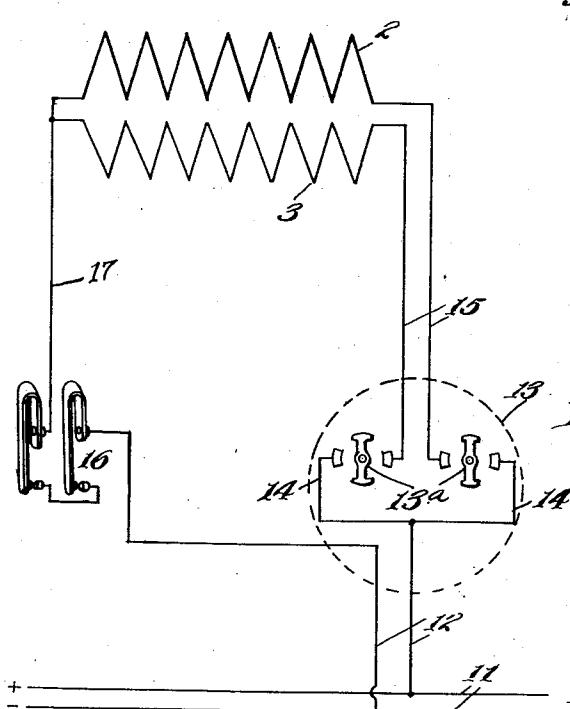


FIG. 5.



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Artis.

UNITED STATES PATENT OFFICE.

ANTONIO LONGORIA, OF CLEVELAND, OHIO.

ELECTRIC HEATING PAD.

1,416,481.

Specification of Letters Patent. Patented May 16, 1922.

Application filed February 18, 1920. Serial No. 359,728.

To all whom it may concern:

Be it known that I, ANTONIO LONGORIA, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and 5 State of Ohio, have invented certain new and useful Improvements in Electric Heating Pads, of which the following is a specification.

This invention relates to electric heating 10 pads.

The objects of the invention are to provide an electric heating pad which is of simple construction and can be made and sold at low cost; which is durable and is 15 not likely to get out of order in service; and in which the heating element is of simple character and is so constructed that it can be uniformly distributed throughout the area of the pad without the necessity 20 of forming large lumps or masses of bulky character. Another object is to provide a heating pad which has maximum flexibility and can be bent or folded without liability of breaking the parts or of injuring the 25 heating element or elements, or affecting the circuits and circuit connections. A further object of the invention is to provide an improved heating pad having a simple thermostatic control so that in operation its tem- 30 perature will not exceed any given temperature for which it may be adjusted. A further object is to provide an improved form of heating element for pads of this kind.

35 Further objects of the invention are in part obvious and in part will appear more in detail hereinafter.

In the drawings, which represent one embodiment of the invention, Fig. 1 is a plan view, partly broken out to expose interior parts; Fig. 2 is a cross sectional view on the line 2—2, Fig. 1, looking in the direction of the arrows; Fig. 3 is an elevation, on a larger scale, illustrating the heating element; Fig. 45 4 is a plan view of the base of the thermostatic controlling device; Fig. 5 is a sectional view on the line 5—5, Fig. 4; and Fig. 6 is a diagrammatic view illustrating the electrical circuits.

50 One important feature of my improved heating pad is the heating element, which is of special form adapted for rapid manufacture in quantity at low cost, and enabling the heating element or elements to be uniformly distributed throughout the pad and at the same time secure maximum flexibility.

This heating element is shown in magnified form in Fig. 3. It comprises a base or body portion 1 in the form of a cord or filament of fairly large size, say three-sixteenths of an inch in diameter, which may be made of any suitable flexible material not likely to scorch, ignite or burn under the prevailing temperature conditions. It may therefore be made of a heat resisting material, such as asbestos, but even ordinary manila hemp cord is suitable for the purpose. This cord may be made of a single strand of twisted fibres or of several strands twisted together. Around the cord is 60 wound in helical form a coil or coils of fine wire forming one or a plurality, two being shown, of resistance elements 2, 3. When two resistance elements are used the wires forming the same are wound in alternate relation so that each convolution of each wire lies between two convolutions of the other wire. Also, for a purpose which will appear, the two wires are preferably of different size or cross section. For 65 example, wire 2 may be a heavy wire and wire 3 a finer wire. These wires may be bare, the air gaps and material of the base 1 sufficiently insulating the convolutions from each other, or, if desired, each wire 70 may be coated with some suitable heat resisting insulating material, such as shellac or the like. This form of heating element is capable of rapid manufacture in large 75 quantities by passing long lengths of the 80 cord and wire or wires through a machine 85 where they are properly twisted together under tension, in a manner somewhat similar to that of forming a multiple strand cord 90 or cable.

To form the heating pad a proper length of the heating element is cut off and is wound back and forth or is otherwise distributed in fairly closely spaced relation between two layers of suitable holding or 95 supporting material, such as canvas or other textile fabric or other material.

In the drawings the heating element is shown as bent back and forth in sinuous form to form a series of parallel portions 4 100 connected at their ends by the bends 5. This arrangement is conducive to the manufacture and assembly of the pad at low cost. For example, a sheet of canvas of proper size is folded across its middle portion, as 105 at 6, Fig. 2, and one strand 4 of the heating element is laid closely adjacent to said fold.

The two plies of canvas are then stitched together along a line 7 parallel with the fold and the strand 4 to form a hollow pocket 8 containing said strand. The free 5 portion of the strand is next bent back at the end of said pocket to form the bend 5 and a second strand 4 lying parallel with the first strand 4 and fairly close to the line of stitching 7, whereupon the second strand 10 4 is secured in its pocket 8^a by a line of stitching 9 parallel to the line of stitching 7. By continuing this process across the full area of the canvas and successively forming lines of stitching, the several parallel 15 strands of the heating element are successively enclosed in pockets 8, 8^a, etc., and the heating element is uniformly distributed over the entire area of the heating pad. More particularly, both of the resistance 20 elements 2 and 3 are individually distributed over the entire pad and the coiling or twisting of each of said resistance elements around the base or body 1 largely increases the total length of each wire in the 25 pad over what it would be were each wire handled individually.

The foundation of the pad, consisting of the canvas plies stitched to form a cover and series of pockets for the strands of the heating element, after proper connection of the two wires 2 and 3 to the electrical circuits, is enclosed in an outer cover or envelope 10, which can be formed of any suitable material, such as flannel or the like, and which is 35 sewn around its edges to completely enclose and protect the parts.

The circuit arrangement is illustrated diagrammatically in Fig. 6. 11 indicates the two main feed wires to which are connected 40 leads 12 each extending to the double switch indicated generally at 13. To one of said leads are connected two branch wires 14 in each of which is a switch member 13^a, said two branch wires being connected to the two 45 resistance wires 2 and 3. Each of said resistance wires, at its opposite end, is connected to a wire 15 which is in circuit with a 50 thermostatic control device 16 connected at its opposite end to the second lead wire 12.

With the arrangement described, by operating either or both of the switches 13^a either or both of the resistance wires 2 and 3 55 may be included in the circuit. The finer wire 3 when used alone produces a moderate heat. The heavier wire 2 when used alone produces a somewhat greater heat and raises the temperature of the pad to a higher degree. If the maximum temperature is desired both switches 13^a are closed and both 60 wires 2 and 3 are included in the live circuit.

The thermostatic control device 16 may be of any suitable construction, its purpose being to limit the maximum temperature which can be reached by the pad. This device, in the form shown, comprises a base or

body 18 of insulating material provided with two openings to receive rivets 19 for securing in place two curved spring arms 20 of suitable bimetallic form. Each of these arms may have a tongue 21 punched down 70 into an opening in the base to prevent the arm from twisting. The two arms lie in parallel with each other and the free end of each is provided with a contact button 22 lying adjacent a contact button 23 on the 75 end of a set screw 24, the two set screws 24 being threaded through openings in a block 25 secured to the base 18 and formed of metal or other conducting material. The bimetallic arms are protected by a sheet 80 metal jacket or cover 26, and the exposed ends of the rivets 19 are utilized for connection of the electric circuits thereto, such as by soldering the wires 17 and 12 to said rivets. 85

The two sets of contacts 22, 23 are in series with each other. If the temperature of the pad exceeds a definite predetermined amount, the rise of temperature, due to the unequal expansion of the two layers of metal of said 90 arms, causes said arms to bend and break the circuit at either or both of the sets of contact buttons. The electric circuit through the pad is therefore opened and remains open until the temperature drops below a 95 predetermined degree, whereupon the arms 20 contract and close and reestablish the circuit.

The heating pad described is of simple construction and has maximum flexibility. 100 It can be readily wrapped around a limb or folded into parallel layers without injuring any portion of the heating element. The circuit arrangements permit three distinct temperatures to be obtained and the thermostatic control prevents the pad from exceeding a definite temperature so that injury to the patient is prevented. 105

What I claim is:

1. An electric heating pad comprising a 110 flexible body portion, a flexible cord-like element distributed uniformly across said body portion, and a plurality of resistance wires of different resistances coiled around said cord-like element, convolutions of one wire 115 being spaced from those of another wire along said cord-like element.

2. An electric heating pad comprising a flexible body portion, a flexible cord-like element distributed uniformly across said body portion, and a plurality of resistance wires coiled around said cord-like element, the convolutions of said wires having alternate and spaced arrangement along said cord-like element. 120

3. An electric heating pad comprising a flexible body portion, a flexible cord-like element distributed uniformly across said body portion, and a plurality of resistance wires of different resistances coiled around said 125 130

cord-like element in spiral form, the convolutions of said wires having alternate arrangement along said cord-like element.

4. An electric heating pad comprising a flexible body portion, a flexible cord-like element distributed uniformly across said body portion, and a plurality of resistance wires

of different resistances coiled around said cord-like element in spiral form, the convolutions of said wires having alternate and 10 spaced arrangement along said cord-like element.

In testimony whereof I affix my signature.
ANTONIO LONGORIA.