My present invention relates to a heating pad having a novel low cost heating element arrangement especially adapted for blanket size pads, and to a method for traversing the heating element with respect to the blanket.

One object of the invention is to provide a simple means for threading the heating element through a backing sheet which takes a minimum of time and results in the heating element being arranged in short sections, with the sections spaced so that they do not come in contact with each other during normal use of the blanket. Another object is to provide a method of threading the heating element through tubes that are inserted into pierced openings of the backing sheet while it is gathered in an accordion-like fashion, the heating element being moved around pulleys during the threading process and the pulleys thereafter being spread apart, following which the backing sheet can be partially straightened to a substantially flat position and the heating element removed from the pulleys so that it will cover substantially the entire area of the backing sheet in its fully stretched position.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my heating blanket and in the steps of my method whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a perspective view of a backing sheet folded in corrugated manner and being periodically pierced by piercing elements in accordance with the first step of my method.

Figure 2 is a sectional view as on the line 2-2 of Figure 1 showing the piercing element through the folded backing sheet and a sleeve associated therewith for following the needle as it is retracted.

Figure 3 is a similar sectional view through the folded backing sheet with the sleeve therein.

Figure 4 is a perspective view showing a further step in my method with the heating element threaded through the folded backing sheet and reeled on pulleys in close coupled relation to the backing sheet.

Figure 5 illustrates the pulleys extended to a far coupled relation with respect to the folded backing sheet.

Figure 6 illustrates the backing sheet partially extended just prior to removal of the heating element from the pulleys.

Figure 7 is a perspective view showing the backing sheet fully extended and the heating element in its final position in relation thereto, and

Figure 8 is a sectional view through the completed heating blanket showing the backing sheet and heating element enclosed between two cover sheets.

On the accompanying drawing I have used the reference character B to indicate a backing sheet and HE a heating element. The heating element HE may be formed of a stranded resistance wire having a suitable flexible insulation such as Vinylite thereon, having both electricity and heating insulation properties. The surface of the heating element is preferably smooth to facilitate the threading thereof through the backing sheet as will hereinafter appear.

The backing sheet for my blanket may be made of cloth material, preferably loose woven of fibre glass, cotton or asbestos fibres although it is possible to use such materials as laminated rubber sheeting or thin flexible plastic sheeting. The heating element HE, it will be noted by reference to Figure 7, is threaded through the backing sheet in such manner as to pass zig-zag across substantially the entire area thereof in a plurality of back and forth traverses. Each traverse is also threaded in a zig-zag manner through the backing sheet itself as shown in Figure 7 with alternate sections of each traverse on opposite faces of the backing sheet.

Appropriate circuit connections may be made with terminal ends of the heating element HE and the backing sheet and heating elements may be enclosed in an outer casing formed of upper and lower cover sheets of blanket like material or the like 10 and 12. The casing 10—12 is preferably removable for cleaning without subjecting the backing sheet and heating element to the cleaning process. For this purpose a suitable separable fastener 14 or similar means may be provided.

To eliminate the necessity of using a needle to thread the heating element HE through the backing sheet, which process would take considerable time and be impractical because of pulling the entire length of heating element back and forth through the backing sheet, I have devised a method of inserting the heating element so that it can take the position of Figure 7 in the final step of the method and the operation can be performed in a minimum of time.

My method involves as a first step, the folding of the backing sheet into a corrugated or accordion-like shape as shown in Figure 1. The backing sheet, while held compressed is then pierced at periodic points as with needles 16 and the needles are followed as they are retracted by tubes or sleeves 18 as in Figure 2. The sleeves assume the position shown in Figure 3 providing a passageway for the heating element. The needles 16 and the sleeve 18 are, of course, supported by suitable mechanism in a machine and the machine itself can be made in many different ways and still accomplish the steps of my method.
While the sleeves 18 are in the folded blanket, the heating element HE is threaded back and forth through the sleeves, being wound from a spool 20. A plurality of pulleys 22 and 24 are located adjacent opposite ends of the sleeves 18 and may be supported by bars 26 or the like suitably mounted in the machine and in the arrangement shown in Figure 4. The pulleys in this figure may be considered as in close coupled relation to the folded backing sheet. The forward end of the heating element is threaded through the sleeves and roved on the pulleys and finally anchored as to a pin 28.

The next step in the method is to move one of the bars 26 to a definite distance apart with relation to the other bar as shown in Figure 5. The pulleys 22 and 24 are preferably mounted on ball bearings to minimize friction so that the heating element will be expanded and reeled from the spool 20 during the spreading of the bars. While the bars 26 are being moved relatively apart, the spool 20 spins rapidly to feed the required amount of heating element around the entire train of pulleys and through the sleeves 18. This provides a predetermined length of heating resistance and a predetermined wattage for the heating blanket.

The sleeves 18 are then removed from the backing sheet and the heating elements. The sleeves are split along one side for this purpose, the slots being designated 19.

The backing sheet B may now be partially straightened to the position shown in Figure 6 and the bends 30 of the heating element removed from the pulleys 22 and 24, after which the backing sheet may be extended, fully to the substantially flat position of Figure 7 whereupon the heating element assumes its final and proper position in relation to the backing sheet. With the bars 26 spread the proper distance in Figure 5, the bends 30 of the heating element will extend from one traverse to the next without sagging and without the heating element keeping the backing sheet from assuming its full length. At about the same time, the machine can be readily adjusted to take care of a great variation in size of backing sheet.

From the foregoing specification, it will be obvious that I have provided a simple and versatile means to thread a relatively long heating element through a sizable expanse of backing sheet such as one the size of a blanket. The resulting product is a relatively low cost heating pad which eliminates all sewing operations. The heating element is supported by periodic passage through the backing sheet and the points of passage are spaced so as to prevent the sections of the heating element between the points from sagging to such an extent that they contact with each other during normal use of the blanket.

Thus, the blanket may be produced by my method with a minimum of labor and at much less expense than with previous methods such as sewing an insulated heating element to the backing sheet or weaving the heating element directly into the backing sheet as a warp or woof thread thereof. Furthermore, sewing the heating element to a blanket size backing sheet is impractical on the usual heating element sewing machines for heating pads. It is also hard to handle such a large assemblage of materials on any sewing machine, even if its feed table were made relatively large.

With my method the collapsing of the backing sheet to an accordion-like position simplifies the passage of the heating element through the several layers of the sheet and the pulley arrangement permits a ready support for the heating element during this step of the process and a means to expand the heating element to its final size.

Some changes may be made in the construction and arrangement of the parts of my device and in the steps of my method without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure, use of mechanical equivalents or use of mechanically equivalent method steps which may be reasonably included within their scope without sacrificing any of the advantages thereof.

I claim as my invention:

1. A method of supporting a heating element on a backing sheet comprising the steps of folding the backing sheet in a corrugated manner, piercing the folded backing sheet at substantially equally spaced points substantially half way between the folded edges thereof, passing the heating element zig-zag through the piercings and in close coupled relation to the folded backing sheet, extending the bends of the heating element to a further coupled position relative to the folded backing sheet, and straightening the backing sheet to a substantial flat position.

2. A method of threading a heating element through a backing sheet comprising the steps of folding the backing sheet in accordion fashion, piercing the folded backing sheet at spaced points, passing the heating element back and forth through the piercings and in close coupled relation to the folded backing sheet, extending the bends of the heating element to a further coupled position relative to the folded backing sheet, and straightening out the backing sheet.

3. In a method of mounting a heating element on a backing sheet, the steps of folding the backing sheet to corrugated shape, piercing the folded backing sheet at spaced points substantially half way between the folded edges thereof, passing the heating element zig-zag through the piercings, and extending the backing sheet to a substantial flat position.

4. In a method of forming a heating blanket or the like, the steps of folding a backing sheet to corrugated shape, piercing the folded backing sheet at spaced points, passing a heating element zig-zag through the piercings, extending the backing sheet to a substantial flat position, and covering opposite sides of the backing sheet to enclose the exposed portions of the heating element.

ALFRED J. HUCK.

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