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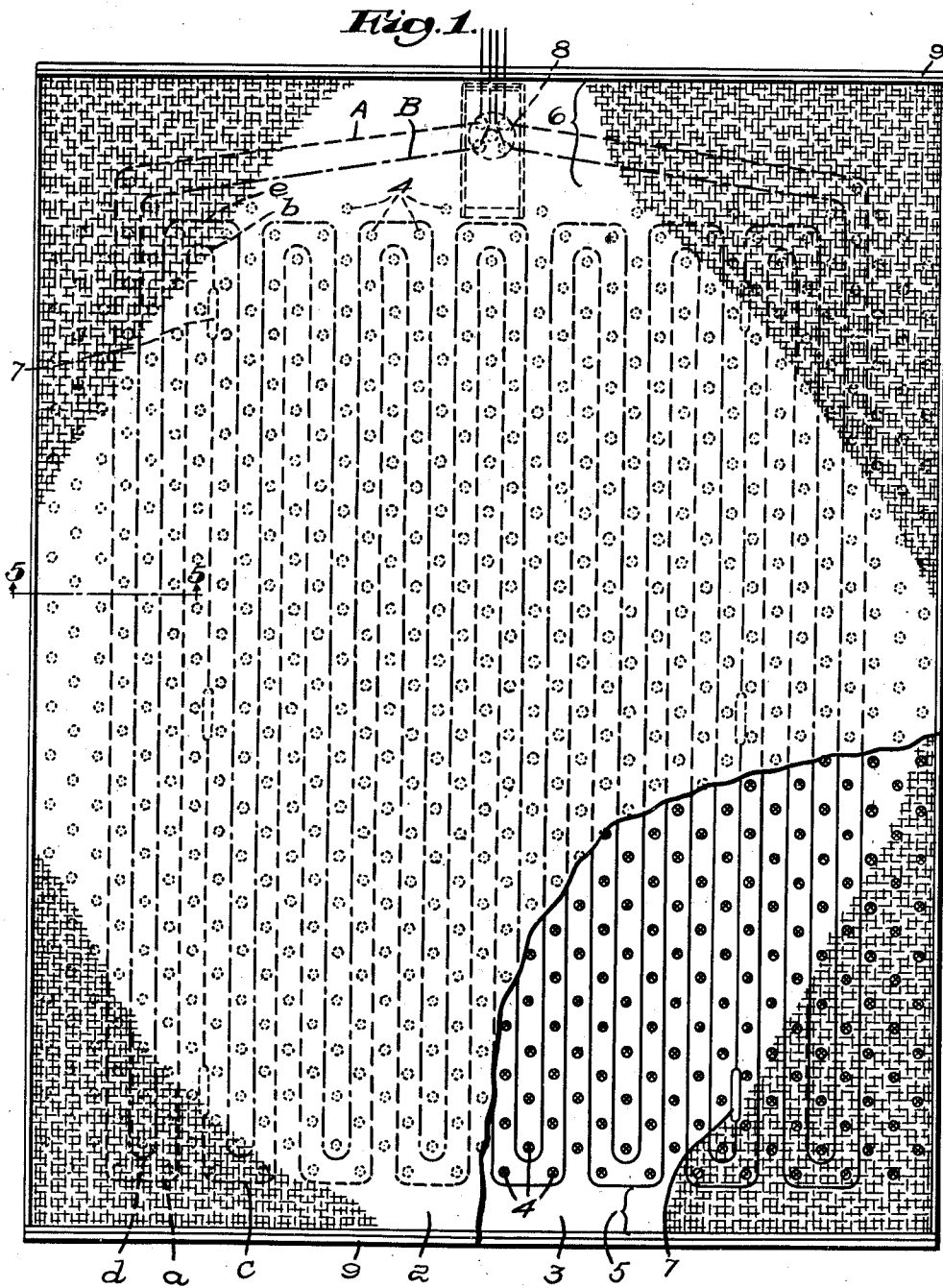
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2,432,785

ELECTRICALLY HEATED TWO-PLY BLANKET

Filed Jan. 8, 1945

2 Sheets-Sheet 1



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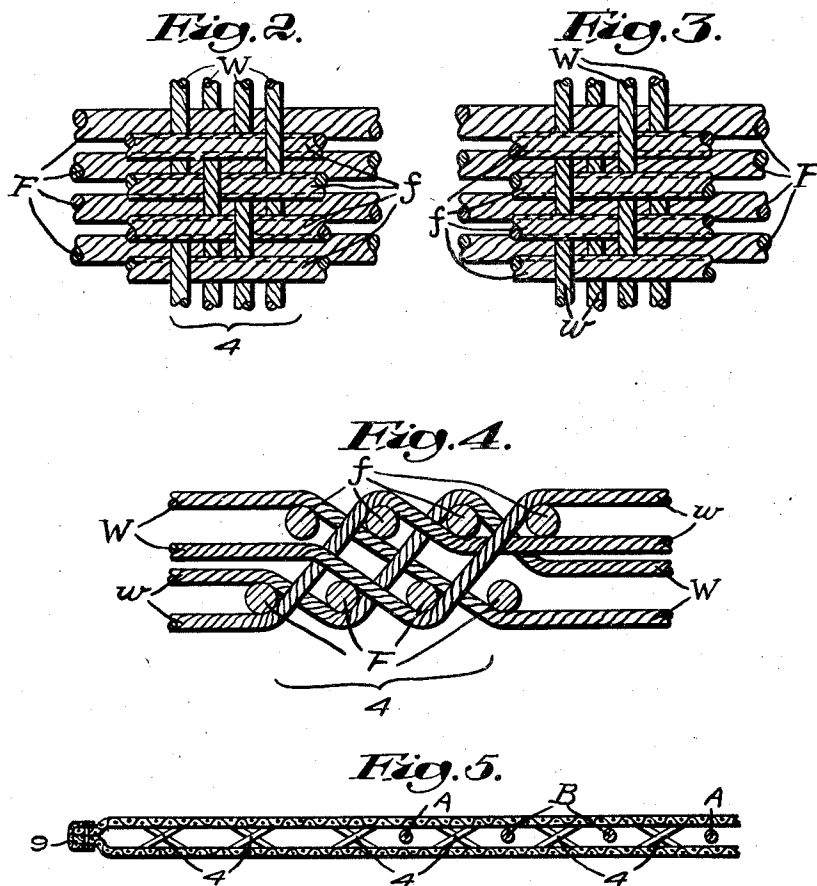
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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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ELECTRICALLY HEATED TWO-PLY
BLANKET

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7 Claims. (Cl. 219-46)

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This invention relates to blankets, mattress covers, heating pads, and the like.

In my earlier Patent No. 2,203,918 I have disclosed an electrically heated blanket which represents an important advance in this industry, as evidenced by the fact that it has been widely accepted commercially. And it is the chief object of this invention further to improve articles of this nature with a view to increasing their efficiency, producing a construction in which the heat generated will be distributed substantially uniformly both at high and low heats, and increasing the heat insulating properties of the blanket and its serviceability without any material increase in the expense of manufacture.

The blanket disclosed in said patent is a two-ply construction so woven as to produce channels or ducts through which the electric conductors can be threaded. In the manufacture of these blankets it has been found that the alternating solid and open weave construction produces a highly uneven or irregular contraction in the warp threads so that those sections of these threads or yarns in the closed section are held under a much greater tension or strain than those in the tubular or channeled portions of the blanket. This fact reduces the tensile strength warpwise of the blanket and tends to cause a transverse puckering or crinkling of the fabric. It increases the difficulty in producing a uniform nap, the tendency being to over-nap the solid sections of the fabric, as distinguished from those in which the plies are separated. And this, in turn, creates a striped effect in the blanket which, while not particularly noticeable when the article is new, becomes highly objectionable as it wears. It has also been found that there is a marked variation in thermal conductivity due to the variation in construction or consistency of adjacent portions of the fabric.

To overcome the objections above described and to devise a better and more thoroughly satisfactory article constitutes the chief object of this invention.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Fig. 1 is a plan view, diagrammatic in character and with parts broken away, illustrating a blanket constructed in accordance with this invention;

Fig. 2 is a plan view on a larger scale of one

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of the small isolated areas distributed throughout the blanket at which the two fabrics or plies are united;

Fig. 3 is a similar view showing the weave in the main body portions of the fabric;

Fig. 4 is a sectional view of the construction shown in Fig. 2, the plane of section extending warpwise of the goods; and

Fig. 5 is a transverse, sectional view of a small portion of the blanket shown in Fig. 1.

Referring first to Fig. 1, the construction there shown comprises a double blanket fabric which consists mainly of two plies or fabrics, separated from each other throughout practically the entire area of the blanket. They are woven simultaneously in the same loom in the manner, for example, commonly used in weaving tubular fabrics, but the harness motion is made such as to interweave a very few of the warp threads with the filling threads at small localized and isolated areas uniformly spaced throughout almost the entire area of the goods. In Fig. 1 these upper and lower plies are indicated at 2 and 3, respectively, and the small interwoven portions are shown at 4.

A typical manner in which these plies are united at the points 4 will be readily understood from an inspection of Figs. 2 and 4 and a comparison of it with Fig. 3. In all of these figures the warp threads in the lower fabric are indicated at W and those in the upper fabric at w, while the filling threads in the corresponding fabrics are designated at F and f, respectively. Fig. 3 shows that the warps in the two plies are interwoven only with the filling threads in their respective plies, while Figs. 2 and 4 show that the warps and fillings of both plies are interwoven with each other at the small areas 4. Only very short lengths of both sets of yarns are interwoven at these points, but they are sufficient to unite the fabrics or plies at these small isolated areas.

Preferably these points of interweaving are spaced apart uniformly, both warpwise and fillingwise, of the entire blanket, except for a short distance 5, Fig. 1, at the head of the blanket, and for a somewhat greater distance 6 at the foot of the blanket, where the two plies are separated, as by tubular weaving in these areas.

It will be seen from an inspection of Fig. 1 that because the fabrics are interwoven only at the small isolated areas 4, and these areas are located at uniform distances apart, the plies are separate from each other throughout most of their area so that conductors may be threaded between them in directions warpwise, fillingwise and diagonally.

In these blankets, as well as in heating pads and similar devices, it is preferable to arrange the conductors in two or more circuits, two being very commonly used, so that either may be used to the exclusion of the other, or both may be used together to produce a higher degree of warmth. In the particular construction shown such conductors are arranged in the two circuits indicated, respectively, at A and B. The wires are laced backward and forward in lengths running from one end of the heated area to the other, and this lacing operation may be performed very easily when the opposite ends of the fabric are open.

An important advantage of the circuit arrangement shown in Fig. 1 is that it permits the close association or interspacing of the conductors of the two circuits throughout the entire area to be heated. It will be seen by tracing the circuit A that longer lengths of it extend lengthwise of the blanket, which is warpwise of the weave, and shorter connecting lengths extend fillingwise or crosswise of the weave. This is also true of the circuit B. Starting from the left-hand side, it will be observed that the conductor A runs to the head space 5 and then makes a reverse turn at a; runs again almost to the foot space 6, where it makes a turn or open loop b; and returns again to the space 3 where it makes another loop c, and this process is repeated indefinitely until that section of the heated area to be covered by this circuit a is completely wired.

Along with this operation the conductor for the circuit B is drawn in, making its first run at the left to the turn d at the head end of the blanket, then reversing and running to the foot of the blanket where it makes another turn e. These operations are continued until the entire portion of the conductor for the circuit B is installed.

It will be observed, however, that substantially throughout the heating unit the conductors are arranged in pairs or in closely spaced parallel lengths that go in pairs. Each pair, in either circuit, terminates at one end in a narrow open loop like that shown at b or d, while each adjacent pair, in the same circuit, terminates at the opposite end in a broader open loop like those shown at a, c or e. Also, throughout the entire width of the unit, except at the extreme edges, one pair of conductors of one circuit alternate with a pair of the other circuit. Thus, if either circuit is used, to the exclusion of the other, the heat created in the blanket is distributed with a high degree of uniformity throughout the entire heated area. Also, if both are used simultaneously, a somewhat greater uniformity of distribution and generation of heat is realized. It should be observed, however, that the delivery of heat to the user of one of these blankets is even more uniformly distributed than is its generation in the heating unit because of the relatively free flow of heated air permitted in all directions through the space between the plies provided by this construction. In other words, air can flow in any direction through this space and around the small interwoven connecting points in much the same way that it flows through a building space between the floor and the ceiling which is supported by a series of columns spaced apart by approximately uniform distances. This invention provides similar intercommunicating passages between the plies of the blanket.

Safety thermostatic cut-outs, such as those shown at 7, are connected into the conductors at

suitable intervals to open the circuit in the event of over-heating. Also, at one end, preferably the foot, the usual junction plate 8 may be installed and the supply wires connected to it are led out through a slot provided in the foot end of the blanket.

If the blanket is made by tubular weaving, then the selvages are at the opposite lateral edges but the head and foot edges customarily are enclosed in an edge binding 9 sewed to the fabric and usually selected with reference to the color scheme and texture of the goods.

Because of the nature of this construction and the manner in which the two blanket fabrics or plies are connected together at small areas only, distributed uniformly substantially throughout the fabric, the difficulties heretofore experienced with severe variations in tension, with the resulting adverse effects on napping and the tendency to crinkle or pucker in the fabric, are completely eliminated. Moreover, the very nearly uniform construction of the blanket, with an approximately continuous space or separation between the two fabrics has been definitely found to increase the heat insulating properties of the blanket. These advantages are important whether or not the blanket is electrically heated. This is also true of the relatively free circulation of air between the plies, as above described, and particularly of the fact that any necessity for wet-finishing of the blanket is eliminated.

The formation between plies above described is of further advantage in facilitating the installation of electrical conductors for heating purposes or mechanical reinforcing elements, such as tapes or straps, which may be found desirable in order to adapt the blanket for use as a hammock, or as the supporting element in a cot or stretcher.

The same construction can be used in electrically heated pads, electrically heated mattress covers, and the like. Also, in some cases only a portion of the blanket, such as the foot section of it, will be so heated. Such a section or an article such as a heat pad or mattress cover, however, is, for the purposes of the present invention, the equivalent of a blanket and the term "blanket" as used in the claims should be understood to include these other devices in which the invention is equally useful. In this connection it may be pointed out that the two circuits above described may be of different wattages. In fact, this is rather common, one circuit, for example, taking twenty (20) watts and the other forty (40) watts, so that when both are used together they will take sixty (60) watts, thus allowing a better gradation of the heat delivered by the blanket.

When the invention is applied to a mattress cover, the junction plate usually will be located at one of the head end corners instead of at the foot, as in a blanket, thus facilitating the connection of the article to a wall plug. These, and various other changes, will be found desirable in applying the invention to other articles than blankets.

It will also be understood that the showing of the small areas at which the plies are united in Fig. 1, is purely diagrammatic and is not intended to indicate the particular shape or outline of these areas.

While I have herein shown and described a preferred embodiment of my invention, it will be evident that this disclosure has been made rather by way of explanation than limitation, and that the invention may be embodied in other forms

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without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. A blanket of the character described, comprising two plies separated throughout the greater part of the structure but connected at intervals spaced both warpwise and fillingwise by small locally interwoven portions of said plies, certain of the threads being transferred from one ply to the other at the interwoven areas.

2. A blanket of the character described, comprising two plies of woven fabric mainly separate from each other but interwoven at small isolated areas spaced apart both warpwise and fillingwise, providing passages between the plies for the flow of air and the threading of conductors in directions at right angles to each other and also diagonally with reference to said directions, each of said isolated areas involving only short lengths of a few yarns of the two plies, certain of the threads being transferred from one ply to the other at the interwoven areas.

3. A blanket of the character described, comprising two plies of woven blanket fabric, disconnected from each other both warpwise and fillingwise throughout a large portion of the area of the blanket, and small interwoven sections connecting said plies at intervals spaced both warpwise and fillingwise and providing intercommunicating passages between said plies which extend lengthwise, crosswise, and diagonally, and electric conductors located in some at least of said passages, certain of the threads being transferred from one ply to the other at the interwoven areas.

4. A blanket according to preceding claim 3, in which said conductors are arranged in a plurality of circuits with the conductors in one circuit closely interspaced between those of the other, whereby an approximately uniform distribution of heat is obtained when both circuits are used together and also when either circuit alone is used to the exclusion of the other.

5. A blanket according to preceding claim 3, in which said conductors are arranged in a plurality

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of circuits with the conductors extending both warpwise and fillingwise between said plies, and one pair of the conductors of one circuit alternating with a pair of another circuit throughout a large part of the electrically heated area.

6. A blanket according to preceding claim 3, in which said conductors are arranged in two circuits and the conductors in each circuit are disposed in closely adjacent parallel lengths arranged in pairs with said lengths of each pair connected at one end of the electrically heated area to form a narrow open loop and at the opposite end to form a wider loop, the loop ends of one circuit being positioned, respectively, inside those of the other at the ends of said area.

7. A blanket according to preceding claim 3, in which said conductors are arranged in two circuits and said conductors extend backward and forward across the electrically heated area in zig-zag formation with parallel closely spaced paired lengths of one conductor alternating with correspondingly spaced paired lengths of the other conductor.

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