Jan. 29, 1935. W. C. BECKER 1,989,582

ELECTRICALLY HEATED MATTRESS, PAD, CUSHION, AND THE LIKE

Filed June 7, 1933

Fig. 1.

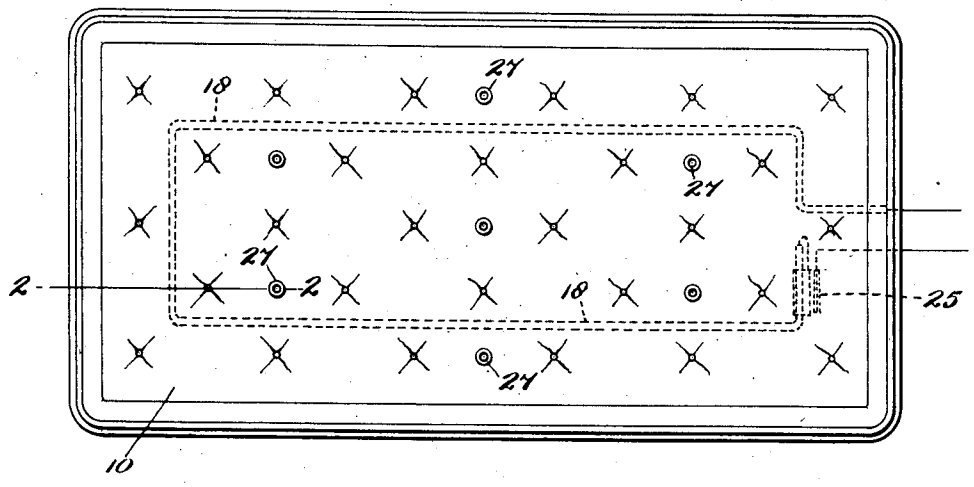


Fig. 2.

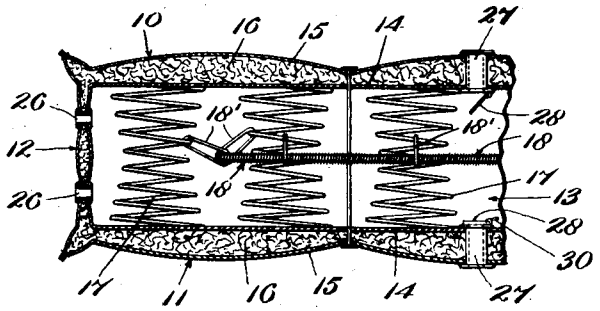


Fig. 3.

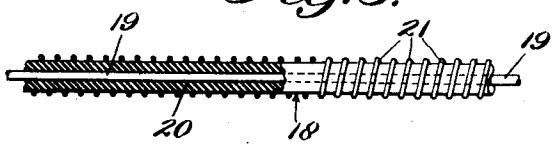
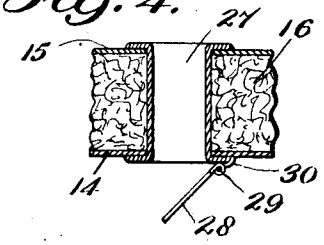


Fig. 4.



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UNITED STATES PATENT OFFICE

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ELECTRICALLY HEATED MATTRESS, PAD, CUSHION, AND THE LIKE

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Application June 7, 1933, Serial No. 674,745

3 Claims. (Cl. 219—46)

This invention relates to electrically heated mattresses, pads, cushions, blankets, and the like, and has for one of its objects to provide a structure of this character which will be simple in construction, comparatively inexpensive to manufacture, and more efficient in use than those which have been heretofore proposed.

Numerous forms of electrically heated mattresses, cushions, pads, etc. have been previously suggested, but so far as I am aware, they have all employed some form of heating element which when included in an electric circuit generates heat solely through its resistance to the passage of the current therethrough. Such elements ordinarily operate at temperatures which introduce a considerable fire hazard into the use of the articles, unless the said elements be carefully shielded and protected with some sort of non-flammable material, usually of a heat insulating character, which tends to reduce their efficiency, and increases the costs of manufacture and operation.

It is well known that when an alternating electric current is passed through a conductor, such for example as a copper wire, and such conductor is provided with an external metallic covering or sheathing electrically insulated from the conductor, there is a marked temperature rise in the sheathing due to inductance. The increased radiating area of the sheath and the larger capacity for stored heat enables the temperature rise to be controlled so that it is insufficient to incur danger of igniting the surrounding materials such as are commonly present in mattresses, cushions, pads, and the like. I have found from actual experiments that such sheathed conductors are better suited to use as heating elements in structures of the character above mentioned than the resistance heating elements which have been heretofore commonly employed; and the utilization of such conductors in mattresses, pads, cushions, blankets and the like constitutes one of the principal features of the present invention.

A further object of the invention is to provide a structure of the kind described in which provision is made for permitting the heat thus generated within the structure to escape to the exterior thereof, whereby, in the case of a mattress for example, the air beneath the bed covers immediately surrounding a sleeping person may be warmed.

With the above and other objects in view, which will appear as the description proceeds, the invention consists in the novel details of construction, and combinations and arrangements of parts, more fully hereinafter described, and particularly pointed out in the appended claims.

Referring to the accompanying drawing, forming a part of this specification, and in which like reference characters designate like parts in all the views:—

Figure 1 is a diagrammatic plan view of a mattress constructed in accordance with my invention;

Figure 2 is an enlarged fragmentary sectional view, taken approximately on the plane indicated by the line 2—2 of Figure 1;

Figure 3 is an enlarged fragmentary detail view, partly in section and partly in elevation, of one type of sheathed conductor which I have found suitable for use in this connection; and

Figure 4 is an enlarged fragmentary sectional view through one of the air circulating passages with which certain of the flammable walls of the mattress structure may be provided, together with the gravity actuated valve for controlling the same.

For purposes of illustration the invention has been shown in the accompanying drawing in connection with a mattress, the detail construction of which forms no especial part of the invention except as will hereinafter appear. The mattress shown is typical of the so-called inner spring type and comprises top and bottom walls 10 and 11, end walls such as 12 and the side walls such as 13. These said walls may be made up of an inner layer of fabric 14, an outer layer of fabric 15 and the padding 16 of cotton, hair, kapok, or the like, all as is usual in this type of mattress construction. The top and bottom walls 10 and 11 are spaced apart as clearly illustrated in Fig. 2 and the coil springs 17 are disposed between them as is likewise in ordinary practice.

The heating unit 18 is disposed within the space occupied by the springs 17 and may follow any suitable path, being here shown as being disposed in substantially rectangular form, intermediate the said springs 17 to which it may be secured by suitable fasteners 18' whereby it is supported out of contact with the walls and springs so as to be completely surrounded by air. As is best shown in Figure 3, said unit comprises an electric conductor 19, such for example as a solid or stranded wire, which conductor is surrounded by a layer of insulation 20 upon the outside of which is a spiral or tubular metallic sheathing element 21. The sheathing element is thus electrically insulated from the conductor 19 and the heat generated thereby is the combined result of the inductance effect in the

sheathing and of such resistance as the conductor 19 may have and is not entirely dependent on electrical resistance as is ordinarily the case. The leads to the said heating element are provided with suitable means of any approved type such, as for example as the well known readily detachable plug connectors whereby it may be connected to the usual house current. If desired a thermostat 25 may be included in the circuit either inside or outside of the mattress, or both, whereby the operations of the heating unit may be automatically controlled in response to the rise and fall of the temperature of the surrounding air of the room and bedding.

Mattresses of this character are frequently provided with air ducts or passages through the end and/or side walls, which passages usually take the form of metallic sleeves or thimbles 26. These passages will provide for a certain amount of air circulation to and from the central space of the mattress, but it is preferred to provide additional air ducts or passages 27 in the top and bottom walls as indicated in Figures 1, 2 and 4. These various air passages permit the air within the mattress to escape as it is heated and to thus warm the air beneath the bed covers immediately surrounding a person sleeping upon the mattress, which of course is quite desirable.

In order to prevent an excessive circulation of cold air into the mattress from below it is preferred to provide the thimbles 27 with suitable gravity actuated valve members 28 which may be pivotally secured to the thimbles 27 as at 29 and provided with suitable stop members 30 whereby their movement in the open direction will be limited. These valve members are so constructed and arranged that those upon the thimbles in the lower wall of the mattress will automatically close as shown in Figure 2, while those of the thimbles in the upper wall of the mattress will automatically open. A direct draft of cold air from below will thus be prevented from entering the interior of the mattress, while the heated air therein will be permitted to escape. Of course if the mattress be turned over the respective valve members will reverse their positions as will be readily understood so that the lower valves are always closed and the upper ones always open.

As above explained the temperature rise of the induction heating element 21 is normally below that which would result in ignition of the flammable materials of the walls 10, 11, 12 and 13 even should these materials come into direct contact with the heating element. On the other hand in the preferred construction illustrated and described the element is normally maintained in spaced relationship to these flammable materials and wholly surrounded by air to which the heat is transferred and which heated air is preferably permitted to escape through the passages 26 and 27 at a rate sufficient that all danger of fire is eliminated.

While one form of the invention has been illustrated and described it is obvious that those skilled in the art may vary the details of construction as well as the precise arrangement of parts without departing from the spirit of the invention, and therefore it is not wished to be limited to the above disclosure except as may be required by the claims.

What I claim is:

1. An electrically heated mattress, pad, cushion and the like, comprising an enclosing structure having spaced walls of yielding flammable material, and resilient elements intermediate said walls; an electrical conductor supported by said resilient elements in spaced relation to said walls; and an inductance heat generating member surrounding said conductor, constructed and arranged for a temperature rise under normal operating conditions which is insufficient to ignite said flammable walls.

2. An electrically heated mattress, pad, cushion and the like, comprising an enclosing structure having spaced walls of flammable material, said walls having openings providing for a circulation of air to and from the interior of said structure; an electrical heating element supported between said walls in spaced relation thereto; and automatic valves controlling at least some of said openings.

3. An electrically heated mattress, pad, cushion and the like comprising an enclosing structure of flammable material; an electrical conductor mounted therein; and an inductance heat generating member adjacent said conductor constructed and arranged to produce a maximum temperature under normal operating conditions, which is below the combustion point of said enclosing structure.

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