June 12, 1956 M. T. BRALEY 2,749,914

THERMAL PACK FOR BODY APPLICATION

Filed Sept. 17, 1952

Fig. 1.

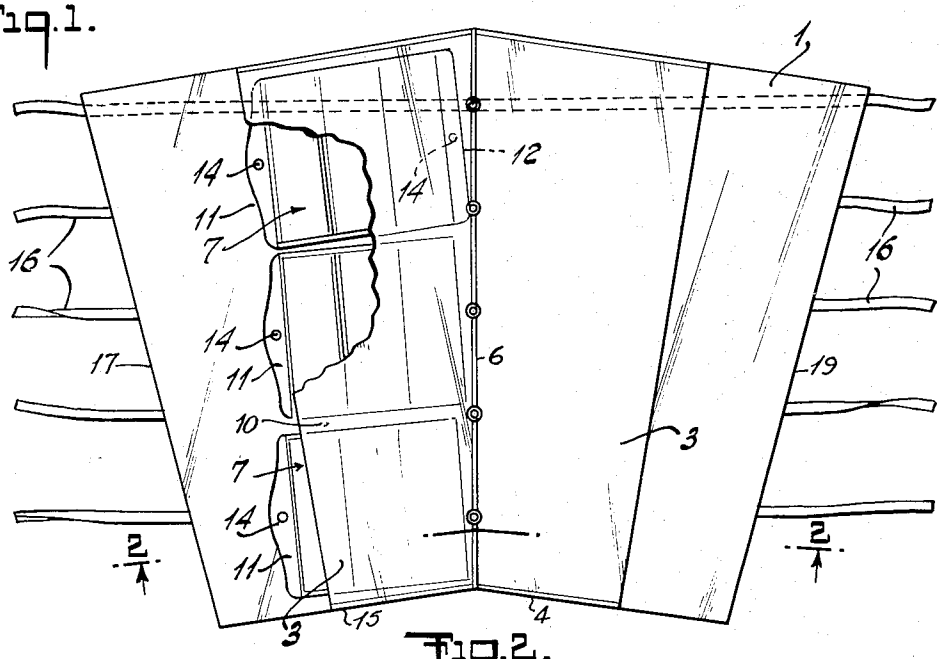


Fig. 2.

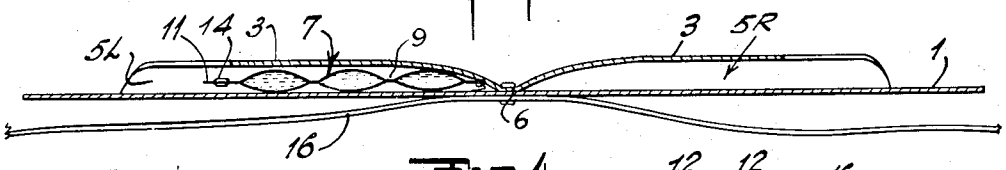


Fig. 3.

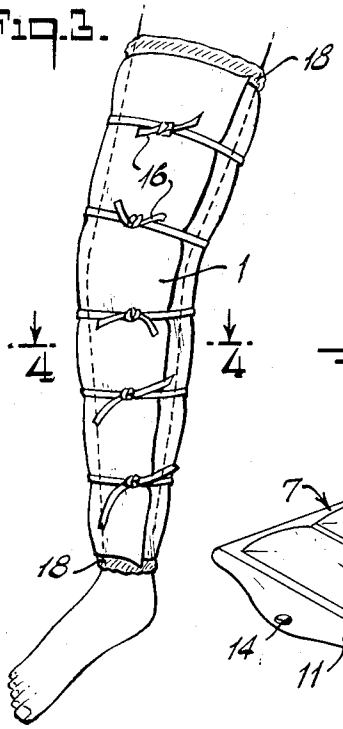


Fig. 4.

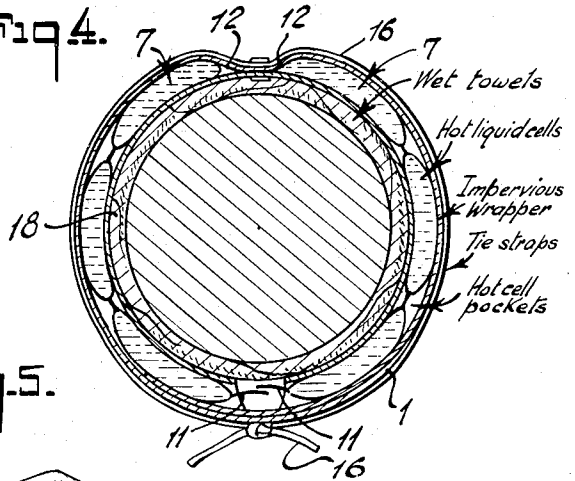
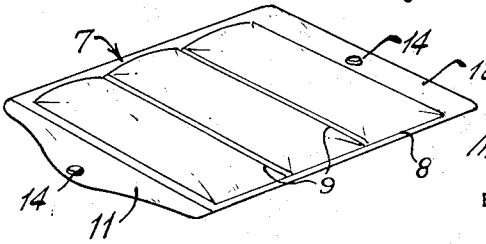


Fig. 5.



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THERMAL PACK FOR BODY APPLICATION

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Application September 17, 1952, Serial No. 310,076

3 Claims. (Cl. 128—402)

This invention relates to a therapeutic hot pack device.

In various therapeutic treatments such as those for poliomyelitis and phlebitis, among others, hot packs are prescribed which require over long periods frequent attention of nurses to remove the towels or dressing from the affected part, dip them in hot water, wring them out and replace them on the patient. Not only does this treatment require an exorbitant amount of attention by nurses or aides, but the frequent disturbance of the patient, especially if the affected part is inflamed or sensitive, as in phlebitis, is objectionable and may interfere with most rapid recovery.

I have now found that such therapy can be greatly improved by use of a novel device which serves both to provide a reservoir of heat and a barrier against loss of heat to the atmosphere—both direct loss by radiation and convection and indirect loss by evaporation of water from the hot towels. I have found furthermore that the therapy, especially for phlebitis, is improved by use of an hydraulic device to distribute a uniform pressure over the flesh of the affected part.

My invention accordingly combines these features by use of a tough, flexible, waterproof sheet which is impervious to water vapor and which is less subject to radiation and convection losses than exposed toweling. This sheet is provided with fasteners to hold it with edge portions overlapped in a tight wrapping on the affected part. On the inside of this wrapper sheet I secure liquid cell units which contain a heat storage liquid (i. e., a stable liquid of relatively high specific heat) in flexible impervious bags or cells, so that any constrictive pressure caused by the wrapper is evenly distributed as hydraulic pressure by these cells and thus may be kept at a minimum at every point.

In the accompanying drawings, I have shown an example of my invention which has received enthusiastic approval of leading doctors and is being sought for as regular equipment by some of the most up-to-date hospitals where it has been used experimentally by such doctors.

In these drawings:

Figure 1 is a plan view of the device laid out flat;

Figure 2 is a cross-section taken on line 2—2 of Figure 1;

Figure 3 shows, in side elevation, the device applied to the leg of a patient;

Figure 4 is a cross-section taken on line 4—4 of Figure 3 showing the structure of the therapeutic hot pack device but without attempting to show any of the structure of the patient's leg;

Figure 5 is an isometric view of a liquid cell unit as used in my device.

Referring to these drawings, the wrapper sheet 1 is made from a tough, flexible, elastomeric plastic such as plasticized vinyl chloride-vinyl acetate copolymer, polyethylene, or synthetic rubber, etc. Polyethylene film is most advantageous because of its combination of flexibility, toughness, softness to the tactile sense of the patient's skin, resistance to surface heat loss, and, in some instances, tranparency (in cases where observance of the affected part is desirable without removal of the device). Where transparency is not required, this plastic sheet advantageously is laminated with aluminum foil or is compounded with aluminum flake or bronzing powder or otherwise treated with a heat reflective material in thin form so that the sheet is rendered substantially impervious to thermal radiation. Its outer surface is smooth so that convection losses therefrom are minimized.

A second sheet 3 which advantageously is also of a plastic such as those mentioned above, but ordinarily not embodying reflective pigment or laminate, is secured to the inside of the first and along its end edges 4 so as to form a pocket 5 for the liquid cell units 7. The width of these pocket areas on the device is advantageously a little less than the circumference or girth of the affected part—in this case shown as a leg. Advantageously, as shown, the sheet 3 is secured along its longitudinal center line 6 to the central portion of the first-mentioned wrapper sheet 1, so that actually pockets 5L and 5R are formed opening to opposite sides.

It is satisfactory in most cases to have one long pocket at each side into which several liquid cell units 7 are inserted side by side; but there is some advantage in making individual pockets by securing the sheets together along the transverse lines 10 between the units 7 so that each pocket is snugly fitted to a single unit 7.

Each unit 7, as shown, has three parallel cells, each hermetically sealed and filled with a stable liquid of relatively high specific heat. Water may be used. Diethylene glycol or a strong aqueous solution of such glycol is better. Hydrocarbon liquids such as di-phenyl or kerosene can also be used. The term "high specific heat" is used herein to indicate specific heats within the range established by the compounds given above, i. e., water, diethylene glycol, di-phenyl, and kerosene, which are representative of the liquids commonly used as heat exchange liquids or coolants. The edge portions 8 and the separating lines 9 in the example shown are heat-sealed together to give permanent hermetically sealed cells and tabs 11 and 12 provided with holes as at 14 facilitate handling when hot.

Tie straps 16 attached to the center on the outside of wrapper sheet 1 serve to hold the device in place and under the desired pressure.

The shape of the sheets 1 and 3 as shown, is approximately trapezoidal in outline but with the end edges bent upwardly, the upper edge 13 thus being convex and the lower edge 15 concave, while the side edges 17 and 19 diverge upwardly. Although not essential to the invention in its broader aspect this is advantageous to assure ready location and better fit on the affected part.

In the use of the device as shown in the drawings and described above the several heat cells 7 are removed from their pocket and placed in a hot water bath of about 115° F. until they are heated to approximately the temperature of the bath. The wrapper portion of the device of the present invention 1, 3, 16 is placed under the limb or other affected portion with the larger end toward the broader portion of the limb. Towels 18 as in the presently used treatment are dipped in water of about 115° F. and then wrung out and wrapped around the limb or other affected part to be treated. The heat cells 7 are now removed from the hot bath and placed in the pocket 5L and 5R under the limb and the two sides of the wrapper sheet 1 are respectively brought up and wrapped around the limb and then tied by the ties 16 snugly, but, in cases of phlebitis, with as little pressure as possible. As thus finally applied, the device is shown in position

in Figure 3, and a diagrammatic cross-section shown in Figure 4 shows the relation of the parts as thus applied without attempting to show any of the structure of the limb.

I claim:

1. A therapeutic hot pack device which comprises a sheet of tough, flexible elastomeric plastic composition of width substantially greater than the girth of an affected limb whereby it is adapted to wrap around said limb with edge portions overlapped, a second sheet of plastic secured to the first along a central longitudinal line and transversely at its ends, forming pockets between said sheets, liquid cell units held in said pockets, each comprised of a pair of flexible sheets of tough elastomeric plastic sealed together at their edges to form a liquid-tight cell and a liquid therein of high specific heat, and flexible tie straps secured to the outside of said first-named sheet at spaced points along a centrally positioned longitudinal line, said straps being no longer than the width of the plastic sheet and extending transversely thereof.

2. A therapeutic hot pack device as defined in claim 1 in which the liquid cell units are also sealed together along a plurality of lines spaced from the edges and from each other to provide a plurality of sealed cells, each of said cells being filled with a liquid of high specific gravity.

3. A therapeutic hot pack device as defined in claim 1 in which the liquid cell units are also sealed together along a plurality of lines spaced from the lateral edges and from each other to provide a plurality of sealed cells, each of said cells being filled with a liquid of high specific gravity, the units being arranged with their said sealing lines parallel to the longitudinal side edges of the first-mentioned sheet, whereby in use the liquid cells are arranged parallel to the axis of the limb around which they are tied.

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