

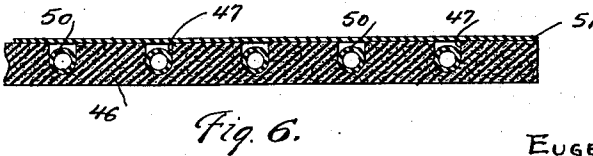
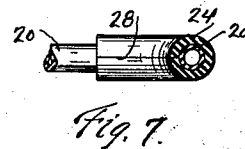
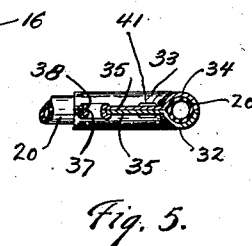
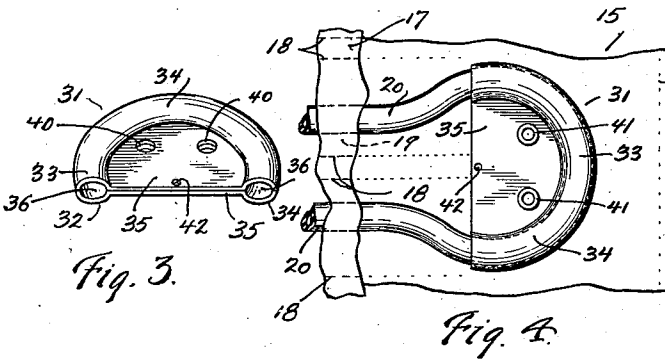
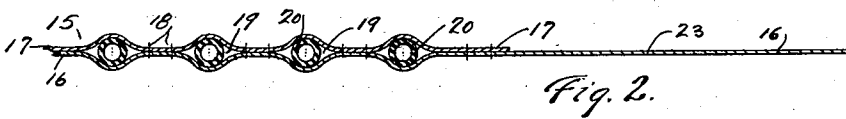
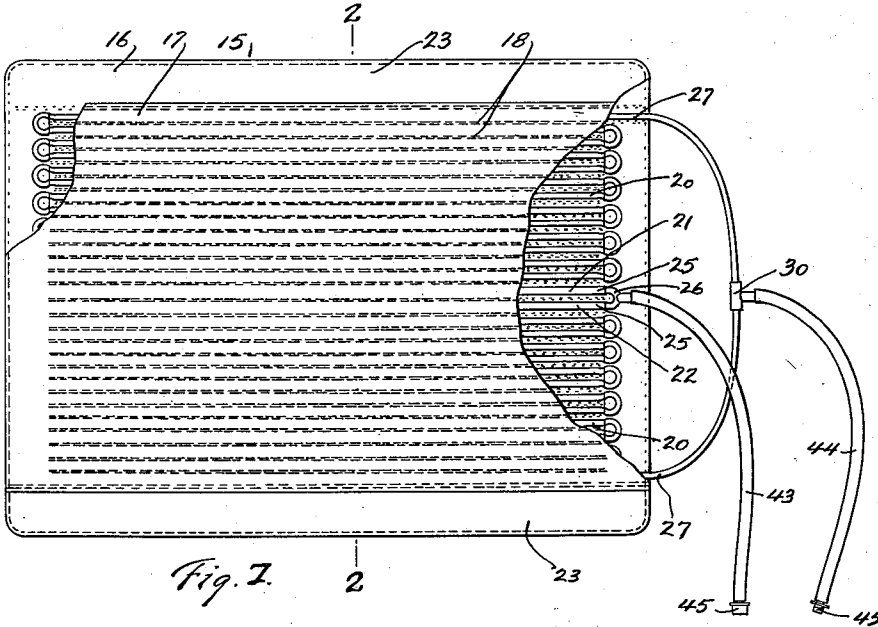
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E. L. BARNES

2,250,325

THERMAL DEVICE

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## UNITED STATES PATENT OFFICE

2,250,325

## THERMAL DEVICE

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3 Claims. (Cl. 257—12)

My invention relates in general to thermal devices, and more particularly to a thermal blanket which may be placed over or beneath a person to produce any desired body temperature, and to devices used in connection therewith to supply thereto a liquid having a controlled or regulated temperature.

It is well known that when the temperature of the human body is uncomfortably high or low, due to atmospheric temperature or other causes, such temperature may be either decreased or increased by the application thereto of devices containing liquid at a temperature intended to produce the desired effect upon the body.

Heretofore, hot water bottles or electric pads or blankets have been used to increase body temperature, and ice bags or packs have been used to decrease such temperature. With the hot water bottle or ice bag or pack, the temperature starts to vary from the time of first application and the period of treatment is limited to a definite length of time when, for instance, the hot water bottle or the ice bag or pack must be refilled or replaced by another one. Furthermore, while the temperature of the heating elements in an electric pad does not vary, and while the heat may be maintained a definite length of time, they are subject to short circuits and consequent burns to the person using the same; they easily get out of order and the elements thereof burn out; and such devices, when in the size of a blanket, are very expensive. Obviously also, the electric pad is applicable only when the temperature is to be increased and cannot, of course, be used where it is desired to lower the temperature.

The principal object of my invention has been to provide a flexible, thermal blanket or pad which may be used either on top of or underneath the person using the same to either increase or decrease the body temperature of such person.

When my invention is used I preferably provide portable (or other suitable) means for continuously supplying a thermostatically controlled liquid therefor.

Another object has been to provide a device which, because of its nature, may be laundered and sterilized without in any way harming the device, thus making it possible to keep the device thoroughly sanitary.

Another object has been to provide a device of this nature which shall have a flexible core through which liquid at the desired temperature may be passed, the device being so designed that the flow of such liquid through the core will not

be readily interrupted when in use by a sharp bend or kink in the core.

Moreover, my device is of such nature that it may be made in various sizes and shapes to fit various parts of the body and thus may be made to perform functions which cannot be performed by any of the present-day devices.

Moreover, my blanket is so designed that the covers thereof may be suitably stitched by well known means before the core is placed therebetween, the stitching being so arranged that the assembling of the core may be conveniently accomplished.

Furthermore, it has been an object to provide reinforcing means at the return bends of the core to prevent the core from collapsing, bending, or kinking.

Moreover, suitable devices for supplying fluid to my blanket should be of such a nature that any desired temperature from the freezing point of water (and even below such temperature if an anti-freeze is added to the water) up to any required degree may be obtained, and then maintained at such degree for as long a period as is desired or found necessary.

Moreover, my device is of such a nature that it may be used at the desired temperature for any length of time without the services of an attendant.

Moreover, my device is relatively inexpensive to manufacture and so designed that it is portable and may be used in hospitals, clinics, sanitariums, or in homes for the control and regulation of body temperatures, whenever body comfort and treatment is desired.

The above objects and advantages have been accomplished by the device shown in the accompanying drawing, of which:

Fig. 1 is a plan view of one of my blankets.

Fig. 2 is an enlarged, fragmentary, transverse, sectional elevation thereof, taken on line 2—2 of Fig. 1.

Fig. 3 is an enlarged, perspective view of one of the return bend fixtures of my invention.

Fig. 4 is an enlarged, fragmentary, plan view showing one of the return bend fixtures in place upon the core.

Fig. 5 is a sectional elevation of a slightly modified form of return bend fixture, showing it assembled to the core of my device.

Fig. 6 is a transverse, sectional elevation of a modified form of blanket, which is designed to be used as a pad.

Fig. 7 is a sectional view of another modified form of return bend fixture.

My invention comprises a flexible blanket and units for heating or cooling the liquid to be used in the blanket.

Referring now to Figs. 1 to 4, inclusive, 15 represents a blanket made in accordance with my invention which may be used as a cover over the person using the same. This blanket comprises two covers 16 and 17 which are fastened together by means of a number of rows of interspaced stitching 18, thus providing a plurality of channels 19 in which the core 20 of my blanket is placed after the stitchings are completed.

The core of my blanket is preferably made of rubber tubing and, in the form shown in Fig. 1, where a full-sized blanket is illustrated, it is preferably made in two sections 21 and 22. Each section of the core is threaded back and forth through adjacent channels 19, and the inlet ends 25 of the sections 21 and 22 are preferably located midway the length of one of the edges of the blanket and are connected to a Y-fitting 26. The outlet ends 27 of the sections 21 and 22 of the core are preferably connected to a T-fitting 30. The convolutions or return passes of the core sections are thus kept in place between the covers 16 and 17 and in interspaced relation with each other by means of the longitudinal stitchings 18. The cover 16 of the blanket is preferably wider than the cover 17, thus providing longitudinal edge portions 23 which may be tucked in under, for instance, a mattress to keep the device in place upon the person using it.

In order to keep the core of the blanket from becoming flattened or kinked at the return bends, it is necessary to provide external fixtures at the bends to maintain the normal area of the core passage, whereby the flow of the liquid there-through will not be restricted. Furthermore, such fixtures must clamp the core at the return bends and prevent stretching thereof and consequent flattening. These fixtures may be of any desired form or design and may be fastened to the return bends of the core by a clamping action, by any suitable cement, or by vulcanizing. These fixtures are arranged along the edges of the cover 17 and in the drawings I have shown a number of forms. In Fig. 3, I show a return bend fixture 31. Each of these fixtures comprises two companion parts 32 and 33 each formed with a groove or channel portion 34 extending in circular manner around the outer periphery of the fixture, the pitch diameter of the portion 34 being preferably greater than the pitch of the return passes of the core, so as to reduce the kinking tendency of the core at the return bends. The length of the circumference of the portion 34 is preferably slightly greater than a semi-circle so that the core may be directed from the fixture to the channel 19 in smooth curves. Each of the parts of the fixture is also provided with a central web portion 35 which is joined to the groove portion 34 and preferably extends to the ends of the groove portions. As shown in Figs. 3 and 4, the members of each fixture are oppositely arranged so as to provide a circular channel 36 for the reception of the return bend of the tubing of the core 20, as clearly shown in Fig. 4. The groove portions 34 are of such size that the tubing is lightly clamped and thereby kept substantially in its normal circular shape, whereby the flow of fluid around the return bends of the core will not in any way be restricted due to any deformation of the tubing at these points. When the parts of the fixture are assembled over the tubing, the groove portions 34 and the web

portions 35 will contact with each other, such portions being fastened together by any suitable means. For convenience, in fastening the parts of the fixture together, I provide two interspaced apertures 40, through the web portions 35, for the reception of an eyelet 41, shown in Figs. 1 and 4. I may also provide a relatively small aperture 42 near the edge of the web portion 35 through which a thread may be passed to attach the fixture to the covers 16 and 17.

As hereinbefore stated, the inlet ends 25 of the sections 21 and 22 of the core are located at the center of the blanket and the outlet ends 27 are located near opposite edges of the blanket. The inlet Y-connection 26 has an inlet conduit 43 attached thereto, and the outlet T-connection 30 likewise has an outlet conduit 44 connected to it. Each of the conduits is provided with a suitable coupling 45 for connecting it to the heating and cooling units, to be hereinafter described.

In the modified form of return bend fixture shown in Fig. 5, the web portion 35 of each of the parts is provided, near the radial center of the fixture, with an aperture 37 through which a grommet 38 is passed when the device is being assembled. If desired, the grommet 38 may also pass through the covers 16 and 17.

In the form of fixture shown in Fig. 7, I provide a return bend reinforcement in the form of a slit sleeve 24 having the slit 28 formed preferably along the inner edge thereof. This sleeve may be of any suitable material, such as rubber or the like. In this form of invention the outer surface of the core is secured to the inner wall of the fixture preferably by suitable cement, or by vulcanizing.

Referring now to Fig. 6 where I show a blanket designed to be used as a pad, 46 represents the base of the pad which is made preferably of sponge rubber or other similar material which will yield under the weight of the person but will have sufficient resiliency to maintain its shape within reasonable limits. Formed in the upper face of this base is a plurality of grooves 47 in which the core 50 of the device is disposed. This core, which is of rubber tubing like that used in the form of invention shown in Fig. 1, may be cemented directly within the grooves and to the base 46, or a cover 51 may be secured to the top of the base and fastened thereto by any suitable means, such as cement. Obviously, return bend fixtures are used in this form of blanket as in the other form above described. The core of this form of blanket is, of course, provided with suitable inlet and outlet connections (not shown) as in the form of Fig. 1.

It is obvious that while the blanket of my invention may be used with any suitable source of supply of thermostatically controlled liquid, I have found that it is more adaptable to general uses, particularly when used in hospitals, clinics, sanitariums, and the like, if a portable source of thermostatically controlled liquid is provided.

Inasmuch as the convolutions or passes of the core extend longitudinally of the blanket, any tendency to kink or sharply bend the core by folding the blanket laterally will be resisted by the flexibility given to the blanket by the many passes of tubes extending longitudinally therethrough. When the blanket is folded longitudinally, any tendency to kink the core at any of the return bends will be resisted by the return bend fixture at that end.

From the foregoing it will be obvious that my device readily takes the place of and is superior

to electric blankets, hot water bottles, ice bags, or ice packs. It can be used at any place where the patient or person desiring to use it may be; and, because of the ability to control the temperature at above or below the normal temperature of the human body, the device has many uses aside from merely producing a comfortable effect on the body in the case of abnormal cold or heat. It has a large number of uses in therapeutics, such as creating an artificial fever and the treatment of throat post-operative cases, as well as general post-operative cases where the heart supplies a sluggish circulation. It also is useful in the treatment of such diseases as arthritis, rheumatism, etc.

Having thus described my invention, what I claim is:

1. As an article of manufacture, a flexible thermal device comprising a blanket having two covers united by means of a plurality of interspaced stitchings, thus forming a number of substantially parallel passageways, a flexible, hollow core disposed in the passageways between the covers and arranged in the form of a plurality of passes, the core being returned upon itself at each of the ends of the passes in zigzag manner and formed thereat with return bends, and a return bend fixture for each return bend of the core for preventing collapse of the core at such bends, the cross-sectional diameter of the channel formed in each of the fixtures being substantially the same as the exterior diameter of the core, whereby the normal area of the core passage at each return bend will be fully maintained.

2. As an article of manufacture, a flexible thermal device comprising a blanket having two covers united by means of a plurality of inter-

spaced stitchings, thus forming a number of substantially parallel passageways, a flexible hollow core disposed in the passageways between the covers and arranged in the form of a plurality of passes, the core being returned upon itself at each of the ends of the passes in zigzag manner and formed thereat with return bends, and a return bend fixture for each return bend of the core for preventing collapse of the core at such bends, each fixture comprising two complementary parts together forming a channel for the core, the cross-sectional diameter of the channel being substantially the same as the exterior diameter of the core, whereby the normal area of the core passage at each return bend will be fully maintained.

3. As an article of manufacture, a flexible thermal device comprising a blanket having two covers united by means of a plurality of interspaced stitchings, thus forming a number of substantially parallel passageways, a flexible hollow core disposed in the passageways between the covers and arranged in the form of a plurality of passes, the core being returned upon itself at each of the ends of the passes in zigzag manner and formed thereat with return bends, and a return bend fixture for each return bend of the core for preventing collapse of the core at such bends, each fixture comprising two complementary parts each formed with a semi-circular wall thereby providing a channel for the core and a web member connected to said wall, and means for connecting said parts together about one of the return bends, said fixtures being carried by said blanket independently of each other to maintain the flexibility of the blanket.

EUGENE L. BARNES.