Oct. 21, 1947. H. R. MILLER 2,429,234

WARMING DEVICE

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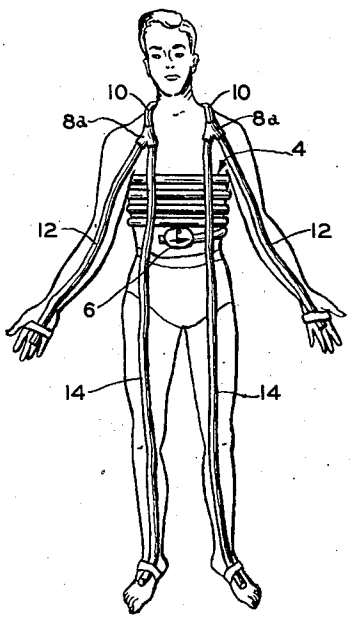


FIG. 1.

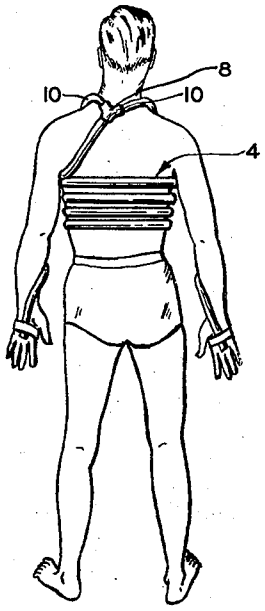


FIG. 2.

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WARMING DEVICE

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1 Claim. (Cl. 128—379)

(Granted under the act of March 3, 1883, as amended April 30, 1928; 370 O. G. 757)

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment to me of any royalty thereon.

The invention relates to warming devices and particularly to devices designed to transfer body heat from one area of the body to another.

The nature and scope of present day warfare require that men be able to work and fight for many hours in temperatures far below freezing. And, although clothing has been developed that keeps the body warm, there has long existed an imperative need that some method be devised whereby the hands and feet of personnel may be protected from the extreme cold, without at the same time being bulky so that personnel are encumbered and do not have free use of their hands and feet.

It is therefore an object of the invention to provide a means whereby the extremities of personnel may be warmed without at the same time being unduly encumbered.

Repeated observations on human subjects exposed to a temperature of —40° and dressed in various types of garments with suitable foot and hand covering reveal that within 90 to 120 minutes the skin temperature of all digits falls to low values (1° to 10° C.). Although a temperature gradient between the trunk and digits is noted, the temperature of the trunk and of the chest is well maintained at about 35° to 38° C.

It is therefore a further object of the invention to provide a simple, low cost and light weight device whereby the heat of the warm air surrounding the chest region may be transferred to the distal portions of the body, i. e. the hands and toes.

The foregoing objects are accomplished in the preferred embodiment of the invention by the use of coils of heat conductive tubing wound around the chest, the coils being provided at their outlet end with a manifold carrying tubing running to the extremities, and at their inlet end with a pressure device whereby air may be forced to circulate through the system. It is preferred that the device be worn next to the skin, although it may be worn over the underclothing.

The scope of the invention is defined in the attached claims. A better understanding of the invention, however, together with other objects and advantages, will be obtained from a consideration of the following description of a device embodying the invention, read in connection with the accompanying drawings, in which

Figure 1 is a front view of the device embodying the invention and shown in position on a human figure and

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Figure 2 is a back view of the device and human figure shown in Figure 1.

Referring to the drawings, the device is seen to comprise a plurality of coils 4 wound spirally about the chest region of the figure, the lower end of the said tubing being connected to a pressure device 6 anteriorly disposed and the upper end of the coil being terminated in a primary Y-shaped connector 8 posteriorly disposed.

The pressure device 6 may be a mechanical blower, a bulb, a compressed air chamber or any other suitable device by the use of which air may be forced through the coil. The Y-shaped connector 8 may be any one of many well known devices used for dividing and directing the flow of a fluid.

The Y-shaped connector 8 feeds into two shoulder tubes 10, one passing forwardly over either shoulder. The tubes 10 terminate in two secondary Y-shaped connectors 8a, from which connectors branch two arm tubes 12 and two leg tubes 14. These tubes 12, 14 extend to the hands and feet, respectively, and are held hereto by any suitable means, such as tape.

It has been found that soft flexible rubber tubing may be used to advantage in this device. Best results were obtained by the use of such tubing having an inner diameter of about 13 millimeters. In testing this device, it was found that cold air (0° C.) introduced into the tubing at the rate of 8 to 10 liters per minute and at a pressure of 15 to 20 mm. Hg was warmed to 32.2° C. or more in less than 1 minute. This warmed air, forced through the shoulder tubes 10 and the arm and leg tubes 12, 14 to the hands and feet of the subject resulted in a corresponding increase in temperature of the hands and feet.

The foregoing description thus discloses a means whereby air may first be warmed by passing through warming coils wound about the chest and then be distributed to the digits of all four extremities, thus making it possible to maintain a level of skin temperature calculated to preserve maximum dexterity and manipulative skill.

It will be noted that in this embodiment the upper part of the coil 4 and the arm and leg tubes 12, 14 are supported by means of the shoulder tubing 10. The entire device may be further held in position by means of a light harness, not shown.

It will be obvious that many modifications are possible. For example, the entire coil portion 4 might be mounted on a vest and then joined together in front by couplings during use. In

such a case, the use of the shoulder tube 10 would not be necessary, and the arm and leg tubes 12, 14 would be tapped directly into the coil portion 4.

Furthermore, although the foregoing discussion has been directed to a case where air is used as the heat transferring fluid, any other convenient fluid may be used. In the event that a liquid were to be used, return tubings would be necessary.

What is claimed is:

A warming system comprising a coil of heat conductive tubing arranged spirally about a substantial portion of the trunk region of the human body, the lower end of said coil ending anteriorly and the upper end of the coil ending posteriorly and terminating in a primary Y-shaped connector, two shoulder tubes connected to the Y-shaped connector and extending forwardly over the shoulders, each of said shoulder tubes terminating in secondary Y-shaped connectors, arm and leg tubing connected to the secondary Y-shaped connectors and extending to the respective four extremities, and a pressure device connected to the said lower anterior end of the said coil whereby air may be forced through the system.

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