Oct. 14, 1958 T. R. JOHNSON 2,855,758

CHEMICAL COOLING GARMENT AND FABRIC

Filed April 5, 1956

FIG_1

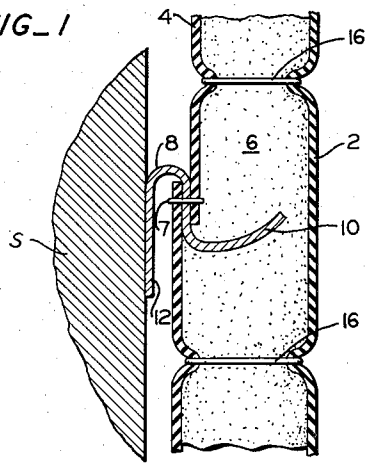



FIG_2

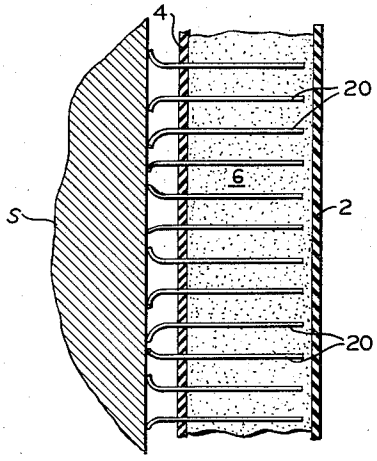
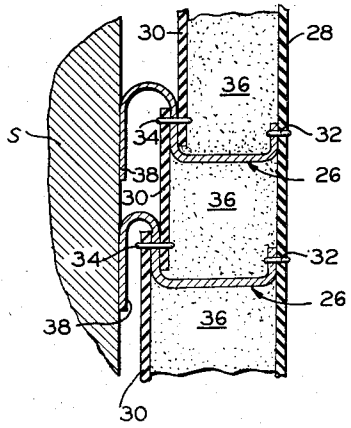



FIG_3




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# CHEMICAL COOLING GARMENT AND FABRIC

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5 Claims. (Cl. 62—4)

(Granted under Title 35, U. S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalties thereon or therefor.

This invention relates to chemical cooling garments and fabrics and more particularly to a fabric and a garment made of such a fabric wherein the contacting with moisture of a chemical contained by the fabric or garment results in the production of a cooling effect.

Under certain circumstances the wearer of a garment finds himself in a location where artificial cooling is necessary or desirable to make him comfortable or perhaps to enable him to carry out his assigned work. In particular, it sometimes occurs that a person is required to wear an impervious garment for protection from the effects of certain ambients which causes uncomfortable overheating of the wearer by impeding the evaporation of perspiration.

A principal object of the present invention is to provide a garment and a fabric which will assist a wearer in keeping cool even when the fabric or garment is impervious to moisture.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawing wherein:

Fig. 1 is a more or less schematic cross-section representing one preferred embodiment of a fabric made according to the invention and representing also a cross-section of a garment made according to the invention;

Fig. 2 is a cross-section similar to Fig. 1, but showing a second preferred embodiment; and

Fig. 3 is a cross-section similar to Fig. 1 showing a third preferred embodiment.

A garment or a fabric made according to the invention comprises a containing section of impervious membrane or the like containing a chemical possessed of a negative heat of solution. Means are provided, activated by the wearer of the garment or fabric, for bringing moisture into contact with the chemical so that, as the chemical goes into solution, a cooling effect is produced which renders the wearer more comfortable. The method by which the wearer activates the moisture-bringing means can be either by crushing or otherwise opening a capsule of water located within the chemical-containing section, or by pulling a cord or the like adapted to remove a plug from a water container allowing the water to contact the chemical, or by squeezing water from a container, or by having the wearer's perspiration pass along filaments of absorbent material by capillary action until it makes contact with the chemical.

Reference is now made to the drawing. In Fig. 1, a section of the fabric or garment is shown as having an outer impervious or moisture-proof membrane **2** and an inner similar membrane **4** forming a containing section for a chemical (particles of which are shown at **6**) having a negative heat of solution. Such chemicals are



well known and include, for example, ammonium nitrate and potassium thiocyanate. Stitched as at **7** or otherwise fastened into and passing through the inner membrane **4** is an element **8** constituted by a piece of absorbent fabric. The threads of this fabric, being made of cotton or wool or the like, constitute filaments of absorbent material which will conduct moisture by capillary action. The portion **10** of the element **8** is disposed in contact with the chemical lying between the impervious membranes, and the portion **12** of element **8** lies outside the membranes and is adapted to be positioned in contact with the skin S of the wearer of the garment or fabric. If desired, to confine the chemical or chemicals in a uniform layer, the fabric can be quilted in the conventional manner as shown by the quilting threads **16**.

In use, a garment, for example, worn by a person undertaking strenuous efforts would cause perspiration of the wearer to accumulate on the skin S. The perspiration is absorbed by the portions **12** of the elements **8**, of which there may be any desired number exemplified by the single one shown in Fig. 1, and the perspiration moisture travels by capillary action along the elements **8** to the portions **10** where it contacts the negative-heat-of-solution chemical. As this chemical goes into solution, a cooling effect is produced which cools the wearer and renders him more comfortable.

Fig. 2 shows a second preferred embodiment of the invention wherein a plurality of absorbent threads **20** is used in place of the fabric **12** of Fig. 1. The threads **20** contact the chemical or chemicals confined between the impervious membranes and conduct moisture from the skin S in the same manner as the cloth **8** of Fig. 1. The use of threads **20** obviates the necessity for stitched seams as at **7**.

A third preferred embodiment is shown in Fig. 3 where pieces of absorbent cloth **26** are stitched to impervious membranes **28** and **30** as at **32** and **34**, respectively, to produce pockets **36** to contain the chemical or chemicals. As in the other preferred embodiments, moisture is conducted from the skin S to the chemicals by the cloth **34** which is in contact at **38** with the skin S of the wearer.

The aforedescribed three preferred embodiments are seen to provide a cooling garment and fabric wherein the perspiration moisture of the wearer produces the cooling effect. These embodiments have the desirable effect of producing a cooling effect which increases with increased perspiration and, therefore, tends to cool the wearer more the more he needs it. The shape of the garment is, of course, a matter of choice. It can be in the form of a sleeveless vest, or a coat, or trousers, or several of these.

From the foregoing it is apparent that the present invention provides a self-contained cooling garment free from the incumbrance of cooling air feeder lines, compressed air cylinders or wet overdrapes requiring continuous wetting by water sprayed by other personnel. The present invention provides a self-contained cooling garment which can be made completely impervious to protect the wearer from contamination and which will operate satisfactorily without any appreciable deleterious effect from the temperature or relative humidity of the ambient atmosphere and which can be manufactured inexpensively and stored without deterioration for long periods.

Obviously many other modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A garment comprising a fabric having an inner im-

pervious membrane adapted to lie adjacent the body of the wearer and an outer impervious membrane spaced, in part at least, from said inner membrane; a chemical having a negative heat of solution disposed between said membranes; an absorbent fabric element passing through said inner membrane and having a first portion disposed between said membranes in contact with said chemical and a second portion exterior to said inner membrane disposed so as to be adapted to contact the body of the wearer.

2. A garment comprising a fabric having an inner impervious membrane to lie adjacent the body of the wearer and an outer impervious membrane spaced, in part at least, from said inner membrane; a chemical having a negative heat of solution disposed between said membranes; and a plurality of spaced absorbent threads passing through said inner membrane, each of said threads having a first portion disposed between said membranes in contact with said chemical and a second portion disposed exterior to said inner membrane so as to be adapted to contact the body of the wearer.

3. A fabric comprising a pair of spaced impervious membranes; a chemical having a negative heat of solution disposed in the space between said membranes; and a plurality of filaments of absorbent material passing through one of said membranes and each having a portion disposed in the space between said membranes in contact with said chemical and having a second portion exterior to said membranes.



4. A fabric comprising an inner impervious membrane; an outer impervious membrane spaced, in part at least, from the inner membrane; a plurality of spaced elements of absorbent fabric passing through said inner membrane and cooperating with one another and with said membranes to form a pocket lying in the space between said membranes; and a chemical having a negative heat of solution disposed in said pocket in contact with said elements of absorbent fabric; portions of said elements lying exterior to said membranes.

5. A garment comprising a containing section of impervious membrane having therein a chemical possessed of a negative heat of solution; and a plurality of filaments of absorbent material passing through said membrane and each having a first portion in contact with said chemical and a second portion so disposed as to be adapted to contact the body of the wearer of the garment.

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