Nov. 23, 1965 O. G. J. STRUYCKEN DE ROYSANCOUR 3,219,514

HEAT INSULATING TEXTILE MATERIAL AND METHOD OF MAKING SAME

Original Filed June 12, 1956

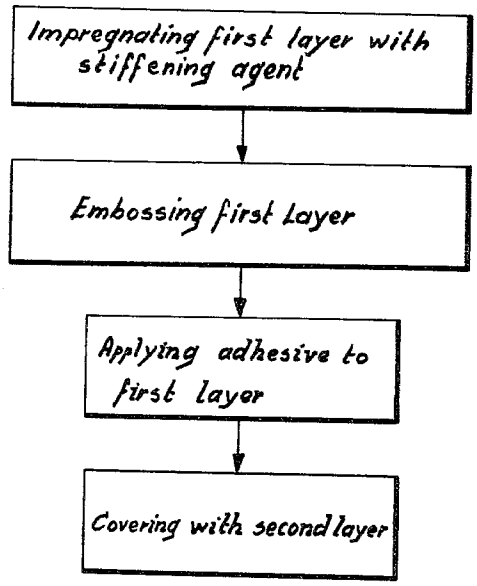

Fig. 1

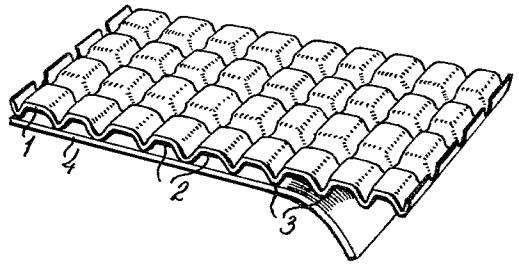

Fig. 2

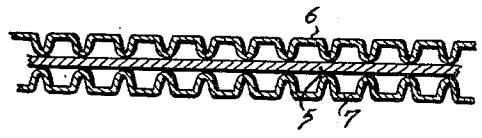

Fig. 3

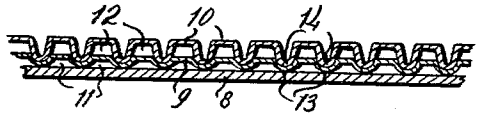

Fig. 4

INVENTOR

OTTO G.J. STRUYCKEN DE ROYSANCOUR

By Taulmin & Taulmin

Attorneys

United States Patent Office 3,219,514 Patented Nov. 23, 1965

3,219,514

HEAT INSULATING TEXTILE MATERIAL AND METHOD OF MAKING SAME

Otto George Johan Struycken de Roysancour, Herungerweg 180, Venlo, Limburg, Netherlands

Continuation of application Ser. No. 590,903, June 12, 1956. This application May 18, 1962, Ser. No. 195,882
Claims priority, application Netherlands, Nov. 21, 1952, 174,019
1 Claim. (Cl. 161—127)

This application is a continuation of my application Serial No. 590,903 filed June 12, 1956, now abandoned, which in turn is a continuation-in-part of my application Serial No. 392,704 filed November 17, 1953, now abandoned.

This invention relates to heat insulating textile material, and more particularly to a new kind of composite textile material having a large number of air cells which impart to the material improved heat insulating properties.

It is an object of the invention to provide a heat insulating textile material which is particularly suited for the production therefrom of garments, blankets and all other articles designed for guarding the body of human beings or animals against direct losses of heat by radiation so as to protect it against low temperatures.

It is another object of the invention to provide a composite textile cloth of the kind referred to, permitting of a simple manufacture and considerable saving of material when compared with the hitherto known fabrics of this kind, while on the other hand insuring improved heat insulating properties.

It is a further object of the invention to provide a new method for manufacturing a composite textile cloth having a great number of air filled interspaces or cells, whereby the resulting cloth shows improved heat-insulating properties.

It is well known in the art that textile materials are especially heat insulating if the layer of material contains a great number of air filled interstices or cells. Thus, clothing fabrics are known which consist of a top and bottom layer and an intermediate network of warp and woof threads. The manufacture of such cloth is cumbersome, time consuming, and costly.

According to the invention a novel composite textile material is provided which comprises a plurality of layers, at least one of which consists of a woven, knitted or similarly produced textile fabric impressed or embossed with a pattern to show a large number of cavities between ridges folded up or crimped from the originally flat cloth, and is impregnated with a natural or synthetic agent thus rendering the embossed pattern of the fabric stable.

According to a preferred embodiment of my invention the composite textile material further comprises at least one secondary textile fabric or cloth, which is substantially flat, i.e. unembossed, and is cemented to the ridges of the above described first layer.

By covering the embossed recesses in the first sheet of fabric by the second, flat sheet, the composite material cloth is thus made to contain in a novel and very simple manner a large number of air-retaining cells.

According to another embodiment of the invention two embossed sheets of cloth are fastened with their ridges to the opposite surfaces of an intermediate flat sheet.

According to yet another embodiment of the invention two embossed sheets of texile cloth material are superimposed upon each other and are then covered on one side with a flat sheet of material.

Other combinations of embossed and flat sheets of textile cloth can easily be arranged, at will.

The cavities or recesses in an individual layer of the composite textile material according to the invention are impressed in the same by an embossing process well known in the art, for instance, by passing the material between steel rolls having any desired embossing pattern engraved on their surface. The embossing process causes the flat material layer to be folded up or crimped to form walls surrounding cavities, as a continuous pattern, which may represent any desired ornamental configuration.

The pattern of stamped-in or embossed recesses and crimped ridges is fixed in the fabric layer by impregnation with a conventional natural or synthetic preferably non-yellowing agent. Such agents are well known in the art of permanently sizing or stiffening textile cloth and similar materials. For instance, aminotriasine-formaldehyde resins, urea formaldehyde resins, phenol-formaldehyde resins, mixtures of cold swelling starch with resin forming agents or the like, have been found to be suitable for this purpose.

The several layers of cloth making up the composite textile material according to the invention are joined to each other by means of an adhesive covering the top surfaces of the ridges in the embossed layer in contact with the other flat or embossed layer or layers.

Adhesives suitable for this purpose are, for instance, Desmodur, Desmogen, Dicrylan C, Cibatex K, Lyofix manufactured respectively by: I. G. Farbenindustrie Aktiengesellschaft and Ciba Limited.

In case the material from which the layers to be joined together are made, is thermosetting, i.e. for instance in the case of nylon, Dacron, perlon, Orlon etc., the application of heat alone is sufficient to bind the two layers together.

For the better illustration of the invention I have shown in the accompanying drawings by way of example only, some possible embodiments of the improved heat insulating textile material.

In these drawings:

FIGURE 1 is a flow sheet showing the steps of manufacturing the composite textile cloth according to the invention,

FIGURE 2 is a perspective view of a preferred embodiment of a piece of the novel, composite heat insulating textile cloth consisting of two textile fabrics, which in this figure are shown partially separated to show the structure of one of said layers.

FIGURE 3 is an enlarged, schematic cross-sectional view of such textile cloth.

FIGURE 4 shows a schematic cross-sectional view also on an enlarged scale, of a fabric of modified arrangement.

Referring to FIGURE 2, the composite textile cloth illustrated therein is composed of a first layer **1**, e.g. consisting of a cotton fabric formed with a plurality of uniformly distributed cavities **2** separated by ridges **3** formed by the walls of the cavities and crimped therebetween and fixed therein by impregnation of the fabric with an aminotriasine-formaldehyde resin.

The cavities and ridges contained in the first fabric **1** are covered by a flat fabric **4** which in this embodiment is cemented with the aid of "Desmodur" to the inner face of the first fabric, i.e. to the tops of the ridges **2**. In this manner, the depressions or cavities **3** are formed into series of closed air containing cells giving the composite fabric the envisaged heat insulating properties.

It will be understood, that although in FIGURE 2 only one pair of interconnected air cells confining layers is shown, constituting heat insulating stratum, also two or more of such pairs may be united to form the novel textile cloth, in which case a flat textile fabric may be common to two layers having cavities impressed therein.

For instance FIGURE 3 illustrates on a somewhat

larger scale, a composite fabric consisting of a flat central sheet **5** having fastened thereto on either side an impressed fabric layer **6** and **7** respectively of the kind indicated at **1** in FIGURE 2 to thereby provide two insulating strata with the use of three fabric layers only.

In the embodiment shown in FIGURE 4 three fabric layers suffice in a similar manner as in FIGURE 3 to provide a composite cloth incorporating two insulating strata. This material also consists of one flat layer **8** and two layers **9, 10** having cavities **11** and **12** respectively impressed therein with ridges **13, 14** crimped therebetween, but contrary to the preceding embodiment the last mentioned fabrics are both arranged at the same side of the flat fabric **8**, in that the fabric **9** is attached by an adhesive or otherwise, directly to the fabric **8**, and the fabric **10** is adhered to the fabric **9**, the cavities in both cases facing the flat fabric **8**. Thus the fabrics **8** and **9** together constitute the first insulating stratum and the fabrics **9** and **10** the second one.

It will be apparent, that the invention is not limited to the embodiments above described and illustrated in the drawing, but that various other combinations of air cell defining fabric layers may be used within the scope of the appending claim. Thus, for instance, the fabric or fabrics complementing the cavities into closed air cells need not necessarily be constituted by a flat fabric, since such fabric or fabrics, if desired, may also be provided with impressions in any arbitrary pattern, to register with cavities in one or more further fabrics, as do layers **9** and **10** in FIGURE 4. Moreover, the nature of the fabric constituting the various layers of the composite cloth and the substances with which some of these layers are impregnated, may be selected at will, a great many suitable fabrics and substances being available to those skilled in the art.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions, and, accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claim.

What I claim is:

A garment to be worn on the human body and comprising flexible and drapable composite heat-insulating textile sheet cloth material in the form of a pair of superposed interconnected cloth fabric layers of which at least one is of uniform thickness throughout and is impregnated with a permanent textile cloth sizing agent to impart resiliency to the layer without eliminating inherent permeability or drapability of the cloth, said layer having impressed therein a plurality of spaced cavities with interconnected surrounding portions isolating the cavities from each other, said surrounding portions being bonded to the other layer of said pair with said other layer sealing off said cavities to provide closed air-containing cells having resilient permeable walls.

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EARL M. BERGERT, *Primary Examiner.*