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54 **GROUNDSHEET.**

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Description

Background of the invention

The invention relates to a groundsheet of elastic material, according to the first part of claim 1. Such a sheet is disclosed in the GB-A-1 134 584.

Conventional mattresses of the type especially used for open-air and military purposes quite simply consist of an elongate rectangular sheet of a porous or foamed material having a thickness of about 5-10 mm and being elastic in character so as to allow rolling up the mattress into a cylindrical, compact roll which can be conveniently stored and carried e.g. on a rucksack. The porous structure of such groundsheet provides an adequate heat-insulating effect despite the relative thinness of the sheet. A serious drawback of the known mattresses is, however, that they conform too easily to the shape of the ground on which they are spread, which means that, for example, pebbles or irregularities penetrate into the mattress and form annoying bulges in the upper side of the mattress. Because of their porous structure, the known mattresses further offer comparatively poor resistance to point pressure; this means that e.g. the branches of a brush mat may easily penetrate through the sheet and damage it. Another drawback is that the known mattresses have low tensile strength, which makes them unsuited for carrying and transporting purposes.

Brief description of the inventive idea

The present invention aims at eliminating the above mentioned disadvantages of previously known mattresses by providing a versatile groundsheet which can be easily manufactured at a low cost. According to the invention, this object is achieved in that the sheet comprises not only a porous, heat-insulating first layer of polymeric material, preferably polyethylene, but also a second layer which also consists of polymeric material, such as polyethylene, but which is non-porous and, thus dense and resistant to point pressure, said second layer being intimately associated with said first layer so as to form a single integrated sheet unit, and the bottom face of said dense second layer having a lower friction coefficient or sliding resistance than the top face of the porous first layer, the material of said second layer having a density which is 10 to 30 times, preferably 20 times the density of the material of the first layer.

Owing to the density of the second layer, the sheet unit obtains, in its entirety, a tensile strength which exceeds by far the tensile strength of the porous layer alone as well as a significantly increased stiffness and resistance to point pressure as compared with the porous layer alone. This increased stiffness—which does not curtail the possibility of rolling up the sheet into a conveniently transportable roll—

means that the sheet can be spread also on uneven ground without objects, such as sharp pebbles or twigs, forming pronounced bulges or tearing holes in the sheet unit. The dense and strong bottom layer of the sheet unit thus distributes any point pressure that may arise, such that e.g. a pebble will show merely as a gently rounded bulge in the porous upper layer. In actual practice, by the increased tensile strength the sheet unit may advantageously be used for carrying and transporting purposes. Thus, the inventive sheet may in a preferred embodiment be provided with a suitable number of holes adjacent the edges of the long sides of the sheet, the holes either themselves forming or defining handles to be gripped by the user's hand or used for insertion of poles or other elongate objects which together with the sheet unit form a stretcher.

Brief description of the accompanying drawings

In the drawings, Fig. 1 is a perspective view of a groundsheet according to the invention, Fig. 2 is an enlarged cross-sectional view of the sheet, Fig. 3 is a perspective view illustrating an alternative embodiment of the sheet, Fig. 4 is a perspective view illustrating the sheet used as a stretcher, and Fig. 5 is a perspective partial view illustrating how a hole in the sheet is used to form a handle.

Detailed description of preferred embodiments of the invention

Fig. 1 shows a groundsheet generally designated 1, having an elongate rectangular form with rounded corners. In practice, the sheet may have a length of about 2 metres and a width of 0.55-0.65 metre. As appears from Fig. 2, the sheet 1 is made up of two layers 2, 3, viz. a first porous, thermally insulating layer 2 of polymeric material, preferably polyethylene, and a second layer 3 of the same polymeric material, e.g. polyethylene, which is however non-porous and, thus, dense and highly resistant, and which forms the bottom part of the sheet. The two layers 2, 3 are intimately interconnected so as to form a single integrated sheet unit, the bottom side of the dense layer 3 being even and smooth, while the top side of the porous first layer 2 has an uneven or rough surface structure. According to the invention, the material of the bottom layer 3 preferably has a density which is 10-30, preferably about 20 times higher than that of the material of the porous top layer 2. In practice, the layer 3 may thus have a density of 0.9-1.0 kg/dm³, while the porous top layer 2 has a density of about 0.05 kg/dm³. The material of the two layers may preferably be low-density polyethylene, the porosity of the polyethylene of the top layer 2 being obtained by foaming. The two layers may either be manufactured separately and be joined in a final manufacturing step, e.g. by heat treat-

ment, or be manufactured from a single web of material which is subjected to foaming on one side, while the other side is allowed to retain its dense character. In both cases, a product is obtained whose two layers form an integrated unit in which every tendency of separation between the layers is precluded. Since the layers are made of one and the same polymeric material, the molecular chains in the bonding zone between the layers will in fact be intermixed and hooked onto each other so as to provide an extremely strong linkage between the layers, which is practically inseparable. The thickness of the bottom layer 3 may be 0.5-2.0 mm, preferably about 1 mm, while the thickness of the top layer 2 may be 2-15, preferably about 5 times the thickness of the bottom layer. In a preferred embodiment, the total thickness of the sheet unit is about 6 mm, and although the bottom layer 3, because of its dense structure, is considerably stiffer than the porous top layer 2, the sheet unit in its entirety is still so elastic that it may be readily rolled up into a conveniently portable cylindrical roll. Since the bottom side of the dense bottom layer 3 is even and smooth, the sheet unit may advantageously be pulled on the ground, e.g. when covered with snow, while the rough surface of the upper side of the top layer 2 will assist in preventing e.g. a person lying on the sheet, from sliding off. The rough surface further allows the access of air between the upper side of the sheet and a person lying thereon, such that, for example, the person's skin will not tend to adhere to the sheet surface, as is the case with even and smooth surfaces.

As appears from Fig. 1, the sheet 1 is provided adjacent the edges of its long sides with a suitable number of holes 4 serving to provide handles for carrying the sheet. Providing groundsheets with holes to form gripping means is per se previously known from US patent specification 4,067,079. In this prior art construction, the holes are however so small that they are suited for gripping only by a few fingers. Characteristic of the holes 4 formed in the inventive sheet unit is that they have the shape of arcuate gaps or slots defining a tongue 5 which can be bent by a hand into a cylindrical or part-cylindrical form. This is illustrated in greater detail in Fig. 5 showing how the tongue or flap 5, owing to the elasticity of the layers 2, 3, can be readily bent by the fingers into a part-cylindrical or arched shape, at the same time as a curved shape is imparted to the portion of material 6 located between the tongue 5 and the edge of the sheet. In other words, the portions of material 5, 6 form a roll-shaped handle portion which allows the user to have a firm hold without the comparatively thin layers of material cutting into his fingers. The possibility of obtaining a firm and ergonomically optimal hold by means of the four gripping holes or slots disposed in the four corners of the sheet 1 is further promoted by the fact that the slots are arranged obliquely in relation to the longitudinal

direction of the sheet. More precisely, an imaginary straight line interconnecting the two opposite ends of the slots, passes obliquely at an angle of 10-30°, preferably about 20°, in relation to the adjacent longitudinal side edge of the sheet. In practice, the handle-forming holes or recesses 4 may be spaced 80-140 mm from the adjacent edge of the sheet.

In the embodiment shown in Fig. 1, the sheet unit has three handle-forming holes 4 along each long side, meaning that four people in all can carry the sheet unit when used as a stretcher, viz. one at each short side and one at each long side of the sheet unit. In practice, the holes or slots 4 can be punched in the sheet unit which also itself can be formed by punching, viz. from a web of material supplied in the form of a roll.

Fig. 3 shows an alternative embodiment having four handle-forming holes or slots along each long side. In this case, the holes merely consist of slits 4' extending arcuately between two spaced-apart punched holes 4" having a comparatively small diameter. In this embodiment, the total covering surface area of the sheet unit is increased, so as to counteract the penetration of moisture up through the handle holes without lessening the possibility of forming a handle by the hand, when so required.

Reference is finally made to Fig. 4 illustrating how two poles or other elongate carrying members 7, 7' can be passed through the handle holes so as to form a stretcher which can be readily carried by two persons. Thus, the inventive sheet unit may preferably be used by soldiers and be included, when in the rolled-up state, in the soldier's normal kit, and be used routinely as a mattress or, on extraordinary occasions, as a stretcher.

The inventive groundsheet may, of course, also be used in fields other than the military one and other than as a mattress. Thus, it may be used, either in original size or as a smaller unit, for moving a bed-confined patient from one place to another, or for changing the patient's position. Moreover, the sheet can be used as a seat for sliding over snowy ground, i.e. on slopes.

Although it is preferred to manufacture the two different layers of the sheet from one and the same polymeric material, such as polyethylene, it is per se conceivable to make them of different polymeric materials, e.g. polyethylene and polypropylene. It is even conceivable to make up the sheet of more than two layers of the type described. It should also be observed that a higher friction coefficient or sliding resistance of the upper side of the top layer as compared with the bottom side of the bottom layer can be achieved other than by making the upper side pronouncedly rough. Thus, it will in itself offer a high sliding resistance even if the surface of the layer is relatively even or smooth.

Claims

1. A groundsheet of elastic material which allows rolling up the sheet into a substantially cylindrical, easily portable roll, whereby it comprises a porous, heat-insulating first layer (2) of polymeric material, preferably polyethylene, and a second layer (3) characterised in that the second layer also consists of polymeric material, e.g. polyethylene, but which is non-porous and, thus, dense and resistant to point pressure, said second layer being intimately associated with said first layer so as to form a single integrated sheet unit, and the bottom face of said dense second layer (3) having a lower friction coefficient or sliding resistance than the top face of the porous first layer (2), the material of said second layer (3) having a density which is 10 to 30 times, preferably about 20 times the density of the material of said first layer.

2. A groundsheet as claimed in claim 1, characterised in that one and the same polymeric material, e.g. polyethylene, is used in the two layers (2, 3).

3. A groundsheet as claimed in any one of the preceding claims, having holes provided adjacent the edges of the sheet for defining handles in the sheet material, characterised in that each hole has the shape of an arcuate gap or slot (4, 4') defining a tongue (5) which can be bent by the hand of the user into a part-cylindrical or arched shape so as to form roll-shaped portions of the sheet material in the area between the hole and a sheet edge.

4. A groundsheet as claimed in claim 3, characterised in that an imaginary line between the ends of said arcuate gap or slot extends obliquely relative to an adjacent edge of the sheet, preferably at an angle of 10 to 30°, preferably about 20°.

Patentansprüche

1. Bodenmatte aus elastischem Material, das ein Zusammenrollen der Matte zu einer im wesentlichen zylindrischen, leicht tragbaren Rolle ermöglicht, umfassend eine poröse, wärmeisolierende erste Schicht (2) aus Polymermaterial, vorzugsweise Polyäthylen, und eine zweite Schicht (3), dadurch gekennzeichnet, dass die zweite Schicht ebenfalls aus Polymermaterial, z.B. Polyäthylen, besteht, aber porenfrei und somit dicht und gegen Punktdruck beständig sowie mit der ersten Schicht eng verbunden ist, um mit dieser eine einzige integrierte Matteneinheit zu bilden, wobei die Unterseite der dichten zweiten Schicht (3) einen niedrigeren Reibungskoeffizienten oder Gleitwiderstand hat als die Oberseite der porösen ersten Schicht (2), und wobei das Material der zweiten Schicht (3) eine Dichte aufweist, die 10 bis 30 mal, vorzugsweise etwa 20 mal die Dichte des Materials der ersten Schicht ist.

2. Bodenmatte nach Anspruch 1, dadurch gekennzeichnet, dass ein und dasselbe Polymermaterial, z.B. Polyäthylen, in den zwei Schichten (2, 3) verwendet ist.

3. Bodenmatte nach einem der vorhergehenden Ansprüche, mit an den Kanten der Matte ausgebildeten Löchern zum Abgrenzen von Griffen im Material der Matte, dadurch gekennzeichnet, dass jedes Loch die Form eines bogenförmigen Spalts oder Schlitzes (4, 4') hat, der eine Zunge (5) abgrenzt, welche von der Hand des Benutzers in eine teilzylindrische oder gewölbte Form gebogen werden kann, so dass im Bereich zwischen dem Loch und der Mattenkante rollenförmige Teile des Mattenmaterials gebildet werden.

4. Bodenmatte nach Anspruch 3, dadurch gekennzeichnet, dass eine gedachte Linie zwischen den Enden des bogenförmigen Spalts oder Schlitzes sich schräg relativ zu einer angrenzenden Kante der Matte, vorzugsweise in einem Winkel von 10 bis 30°, vorzugsweise etwa 20°, erstreckt.

Revendications

1. Tapis de sol en matériau élastique permettant de rouler le tapis en un rouleau essentiellement cylindrique, facilement portable, comprenant une première couche (2) calorifuge poreuse en matériau polymère, de préférence du polyéthylène, et une seconde couche (3), caractérisé en ce que la seconde couche est également en matériau polymère, par exemple du polyéthylène, mais non poreux et par conséquent dense et résistant à la pression ponctuelle, ladite seconde couche étant intimement associée à ladite première couche de façon à former une seule unité plane intégrée et la face inférieure de ladite seconde couche (3) dense ayant un coefficient de frottement ou une résistance au glissement inférieur à la face supérieure de la première couche (2) poreuse, le matériau de ladite seconde couche (3) ayant une densité 10 à 30 fois, de préférence environ 20 fois supérieure à la densité du matériau de ladite première couche.

2. Tapis de sol selon la revendication 1, caractérisé en ce qu'on utilise un seul et même matériau polymère, par exemple du polyéthylène, pour les deux couches (2, 3).

3. Tapis de sol selon l'une quelconque des revendications précédentes, présentant des trous à proximité des coins du tapis, délimitant des poignées dans le matériau du tapis, caractérisé en ce que chaque trou a la forme d'une fente ou d'une entaille en arc (4, 4') délimitant une languette (5) repliable par la main de l'utilisateur sous une forme partiellement cylindrique ou arquée, de façon à permettre de rouler des portions du matériau du tapis de sol dans la zone située entre le trou et un coin du tapis.

4. Tapis de sol selon la revendication 3, caractérisé en ce qu'une ligne imaginaire réunissant les extrémités de ladite fente ou entaille en arc est oblique par rapport à un coin proche du tapis, formant de préférence un angle de 10 à 30°, de préférence d'environ 20°.

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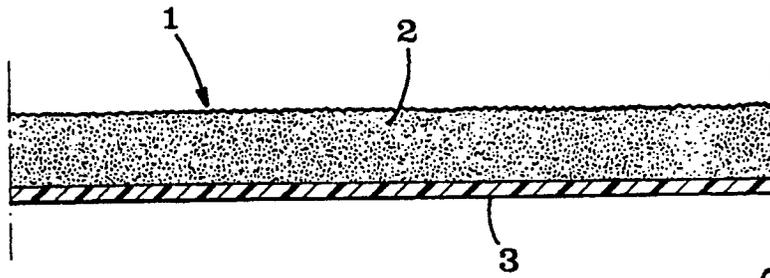
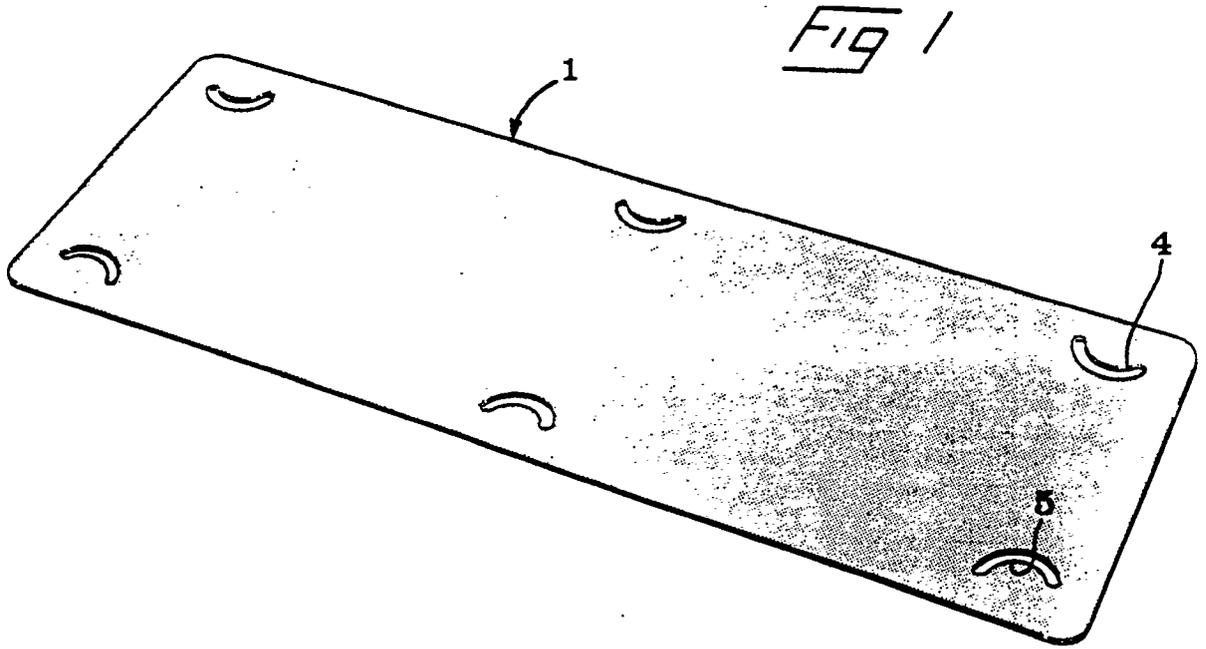


Fig 2

