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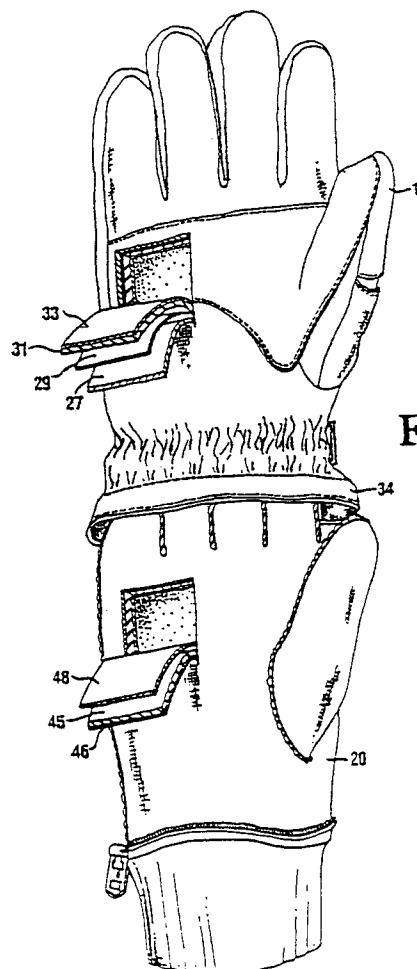
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I-20122 Milano (IT)(54) **Improved multi-ply glove construction.**

(57) A multi-ply glove or mitt construction which includes an insulated outer shell (10) and a removable liner (20), with the shell (10) and liner (20) being designed for separate use or to be worn in combination. The multi-layer outer shell (10) includes an outer water repellant layer (27), an inner heat insulating layer (31), a vapor barrier layer (29) located between said outer water repellant layer (27) and said inner heat insulating layer (31), and a moisture absorbing layer (45) formed on the inner surface of the heat insulating layer (31). The glove construction also includes a functional curve pattern for maximum comfort and fit.

**FIG. 1****EP 0 683 989 A1**

Field of the Invention

This invention relates to multi-ply gloves (or mitts), having an outer insulated shell which provides a desired heat insulating and waterproof enclosure for the hands of a wearer, and a selectively removable and/or exchangeable liner in the insulated shell, the shell and the liner being specifically designed in combination to keep the hands warm and dry under the most severe weather conditions.

Background of the Invention

In U.S. Patent No. 4,662,006, (hereinafter the '006 Patent), assigned to the same assignee as is the instant invention, there is described a multi-ply glove construction that has many advantages over the prior art. More particularly, the glove in the '006 Patent is formed from a multi-ply shell and a selectively removable liner, with the shell capable of use with, or without, the liner, in order to provide selected degrees of hand protection. The shell has an outer water repellant layer of leather, closely woven textile fabrics, or the like. An inner heat insulating layer in the shell is formed of a lofting material such as down, DACRON, FIBER-FILL, THINSULATE fiber, or foam. A waterproof breathable layer formed preferably of a poromeric material such as GORE-TEX is arranged between the water repellant layer and the heat insulating layer, and a slide layer formed of a relatively smooth material such as brushed nylon or the like is formed on the interior surface of the heat insulating layer, and bonded thereto. The inner slide layer on the insulating layer is preferably formed with a brushed surface permitting relatively free movement of another material thereover, yet acting to retain material in position so that the liner may be readily inserted, but tend to remain in position after insertion.

The liner selectively utilized within the shell is preferably of a multi-ply construction formed to provide different degrees of heat insulation dependent on climatic conditions and formed of a pile, synthetic natural, or blend fabric, or of a lofting material, or a knitted cashmere or the like. The exterior face of the liner is formed with a coarse surface layer provided by a brushed or sueded material such as woven or knit nylon or the like, and the interior surface of the liner is preferably provided with a slide layer formed by utilizing a non-brushed nylon to facilitate insertion of the hands of the wearer.

Arranged at the cuff of the liner, and the cuff of the shell, are fastening elements provided by mating VELCRO strips, zippers, and the like, serving to permit selective attachment of the liner to the shell.

Although the glove in the '006 patent has many advantages, it has been found that various improvements are possible. This invention is directed to those improvements.

Summary of the Invention

In accordance with the objects and features of the instant invention, a glove and mitt construction is provided, comprised of an insulated multi-layer outer shell and selectably removable inner liner.

It is a feature of the instant invention that said insulated multi-layer outer shell comprises an outer water repellant layer, an inner heat insulating layer, a vapor barrier layer located between said outer water repellant layer and said inner heat insulating layer, and a moisture absorbing layer formed on the inner surface of said heat insulating layer.

It is an aspect and feature of the invention, that said vapor barrier layer functions to trap natural body humidity within the glove construction, thereby minimizing heat loss.

It is another aspect and feature of the invention that said moisture absorbing layer formed on the inner surface of said heat insulating layer permits the glove to be worn without use of the selectively removable liner, thereby providing maximum flexibility in tailoring glove use to all weather conditions.

It is a still further feature of the invention that a degree of curve is incorporated into the fingers of the inventive multi-layer glove to provide maximum comfort when the glove is in use.

These and other objects and features of the invention will be more fully appreciated from the following detailed description when taken in conjunction with the accompanying drawings in which:

Brief Description of the Drawings

In the drawings:

FIG. 1 is an exploded perspective view of a glove construction in accordance with the instant invention;

FIG. 2 illustrates the construction of the vapor barrier insert included within the glove of FIG. 1; and

FIG. 3 illustrates a functional curve pattern used with the instant invention.

Detailed Description of the Invention

Referring now to FIG. 1, there is shown a glove of multi-ply construction in accordance with the improvements of the instant invention. The inventive multi-ply construction comprises an outer water repellent layer 27, which layer is formed of a variety of conventionally employed glove shell materials, such as leather, nylon or other synthetic ma-

terial, or other blends of fibers. This layer may also be plastic coated.

Adjacent to the water repellant layer 27, is a waterproof breathable layer 29. In the '006 patent, this layer was formed of poromeric materials such as GORE-TEX Polytetrafluoroethylene. In accordance with the instant invention, as described below, this layer has now been improved.

The glove also consists of a heat insulating layer 31, positioned adjacent to the waterproof breathable layer 29. The heat insulating layer may be formed of a variety of materials such as a lofting material, or one which tends to expand in thickness so as to create air pockets between the top and bottom surface thereof. Down or synthetic or natural material fiber may be satisfactorily employed for this purpose. THINSULATE is one material that is found to be suitable.

Secured to the inwardly facing surface of the heat insulating layer 31, is a slide layer 33. In the '006 patent, this layer consists of an unbrushed or smooth material, which was necessary in order to provide a slide surface for easy passage of a hand, or liner, into the shell 10. This layer has now been improved, as will be described below.

Liner 20, as shown at the bottom portion of FIG. 1, consists of a relatively porous, moisture absorbing layer 45, which layer serves to provide desired warmth and comfort. A variety of materials can be employed for use in this layer, including flannel fabric formed of woven or knit synthetic material, or a blend of fibers.

A smooth outer layer 46 is preferably formed on the porous, moisture absorbent layer 45. A smooth inner surface 48 is provided, preferably of a knit, relatively soft textile fabric, made up of material or synthetic fibers, or a blend thereof. The actual manner of enabling and constructing the multi-ply glove shown in FIG. 1 is described in detail in the '006 patent, the teachings of which are incorporated herein by reference.

The first improvement accomplished with the instant invention, is to change the composition of the slide layer 33 from an unbrushed or smooth material, to a brushed or sueded material, thereby creating a moisture absorbing layer for the outer insulated shell portion of the glove. The previous slide material used in the '006 patent was unbrushed and, accordingly, was not able to readily absorb moisture, a situation that could leave a wearer's hand cold and damp if excess moisture was generated during exercise such as skiing. The new brushed slide material comprising layer 33, allows for greater moisture absorption and pass through of moisture to the other layers of the multi-ply components.

Most importantly, use of this layer having greater moisture absorbency, greatly enhances

user comfort, when wearing the multi-ply outer insulated shell component without the removable liner. Use of the glove without the removable liner, is often advantageous in response to varying weather conditions, for example when less heat retention is desirable. Accordingly, use of the new moisture absorbent layer 33 greatly enhances this feature of the multi-ply glove construction.

An additional change necessary to facilitate use of the brush slide material for layer 33, is the necessity to create additional attachment points between the finger and thumb areas of the multi-ply insulated shell. More particularly, with the glove described in the '006 patent, the only attachment points between the multi-ply layers of the shell were at the cuff area. With the instant invention, however, the change from a smooth to a brushed slide material at layer 33 requires the addition of attachment points. Without additional attachment points between the layers of the multi-ply shell, the friction between the hand and the brushed slide material, when worn without the removable liner, would cause the multi-ply shell components to separate when the wearer attempted to remove his or her hands from the multi-ply shell. Such separation in the finger areas would make it difficult, if not impossible, for the wearer to reinsert his or her hands, or reinsert the liner into the multi-ply shell. Accordingly, with the instant invention, the multi-ply shell components are also held together at the finger and thumb tips on the glove, and the finger area and thumb area on mittens.

For example, the outer layer 27, and the water proof breathable layer 29, must be joined together at the finger and thumb tips. In addition, the heat insulating layer 31, must be fastened at the finger and thumb tip area under the water proof breathable layer 29. It is essential that all layers of the multi-ply shell be joined together in both the finger and thumb tip area, and also at the cuff area. The preferred method of joining the multi-ply gloves at the finger area is by gluing. However, other methods, such as stitching, laser, ultrasonic, or heat attaching may be used.

An additional requirement to accommodate the improvement of the greater moisture absorption layer 33, is that the outer most component of the liner, layer 46, must be of a smooth material to properly slide against layer 33 of the shell. It is essential that the correct friction ratio exist between the two slide materials (33 and 46), to allow for ease of insertion of the removable liner into the shell. Without the correct friction ratio, it would be difficult to insert the removable liner into the shell and maintain it in the proper position.

An additional improvement achieved with the instant invention, may be accomplished by making layer 29 from a vapor barrier material. This material

is illustrated in FIG. 2. This vapor barrier material is an insert comprising a very thin plastic layer, into which a plurality of small holes have been added. The purpose of the vapor barrier is to trap the natural body humidity, which helps keep the hand warm. This is accomplished by the use of the vapor barrier insert, which surrounds the lining and traps body moisture, thereby increasing the humidity in the lining system and significantly reducing evaporative heat loss.

An additional improvement provided with the instant invention, is illustrated in FIG. 3. It is known in the glove business that "curved finger gloves" have been in existence for an extended period of time. However, it is important to determine the correct curve for each finger joint in order to achieve ultimate comfort. Experimentation and study have focused on the natural position of the hand in its relaxed state, and also the position of the hand when the fingers are gripping an object, such as a ski pole.

In multi-ply construction, this pattern must be determined for both the liner and the shell, either alone or in combination. Also, it is important to note that use of such a curve pattern, as illustrated in FIG. 3, is only necessary when the glove and liner are made of non-stretchable material. Other materials, such as leather or fabrics with normal stretch characteristics, may be cut from conventional patterns.

It is also known that if too much of a curve is formulated in the pattern of FIG. 3, the wearer may be very comfortable while utilizing the gloves while gripping a ski pole, for example, but experience discomfort when wearing the glove with the hands in a relaxed position. The opposite would be true if the pattern has less than the appropriate curve.

The basic parameters of a hand in a relaxed position were studied. It was determined that a hand in its naturally relaxed state had a degree of curve measured from the knuckle to the tip of the finger of between 15 and 25 degrees. The fourchettes were then developed to allow for this type of curve on the finished product.

The amount of curve allowed in the palm of the hand to accommodate easy gripping of a ski pole without hand fatigue was then determined. This was not a degree of measurement, but more a function of comfort. This was established through a trial and error basis by effectively changing the fourchettes in a small degree and, in a larger sense, altering the difference between the overall length of the palm hand and the back hand until the optimum position was established.

Several other factors are instrumental in establishing the degree of curve in a glove. The most important is the difference in the length of the palm part of the glove to the back part of the glove. To

obtain the proper curve to the finished product, the back must be longer than the palm part of the glove. The difference between the length of the palm and the length of the back, is crucial in determining the degree of curve. For a conventional glove, the overall length of the palm is approximately 3/4" shorter than the overall length of the back. On the new patterns of FIG. 3, however, the overall length of the palm hand is approximately 1" less than the overall length of the back. This translates to a 33 percent difference between a conventional glove and the pattern shown in FIG. 3.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof, and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

Claims

1. A glove or mitt construction comprising a multi-layer outer shell and a selectively removable liner, said multi-layer outer shell comprising an outer water repellant layer, an inner heat insulating layer, a vapor barrier layer located between said outer water repellant layer and said inner heat insulating layer, and a moisture absorbing layer formed on the inner surface of said heat insulating layer.
2. A glove or mitt in accordance with Claim 1, wherein said vapor barrier layer functions to trap natural body humidity, thereby minimizing heat loss in the glove construction.
3. A glove or mitt construction in accordance with Claim 2, wherein said multi-layer components are fastened together in finger and thumb areas of the construction, as well as at a wrist area.
4. A glove or mitt construction in accordance with Claim 3, wherein said selectively removable liner comprises a woven or knit fabric of natural synthetic or a blend of such fibers.
5. A glove or mitt construction in accordance with Claim 4, wherein there is provided inter-engaging means between said removable liner and said outer shell.
6. A glove or mitt construction in accordance with Claim 5, wherein said removable liner consists of a layer of relatively absorbent material removably positioned in said multi-layer outer

shell.

7. A glove or mitt construction in accordance with Claim 5, wherein said removable liner comprises a relatively coarse outer surface layer on said absorbent layer, and a relatively smooth inner surface layer on said absorbent layer. 5
8. A glove or mitt construction in accordance with Claim 1, wherein said construction includes a back portion and a palm portion, the overall length of said palm portion being shorter than the overall length of said back portion by a distance between 1/2" and 1". 10 15

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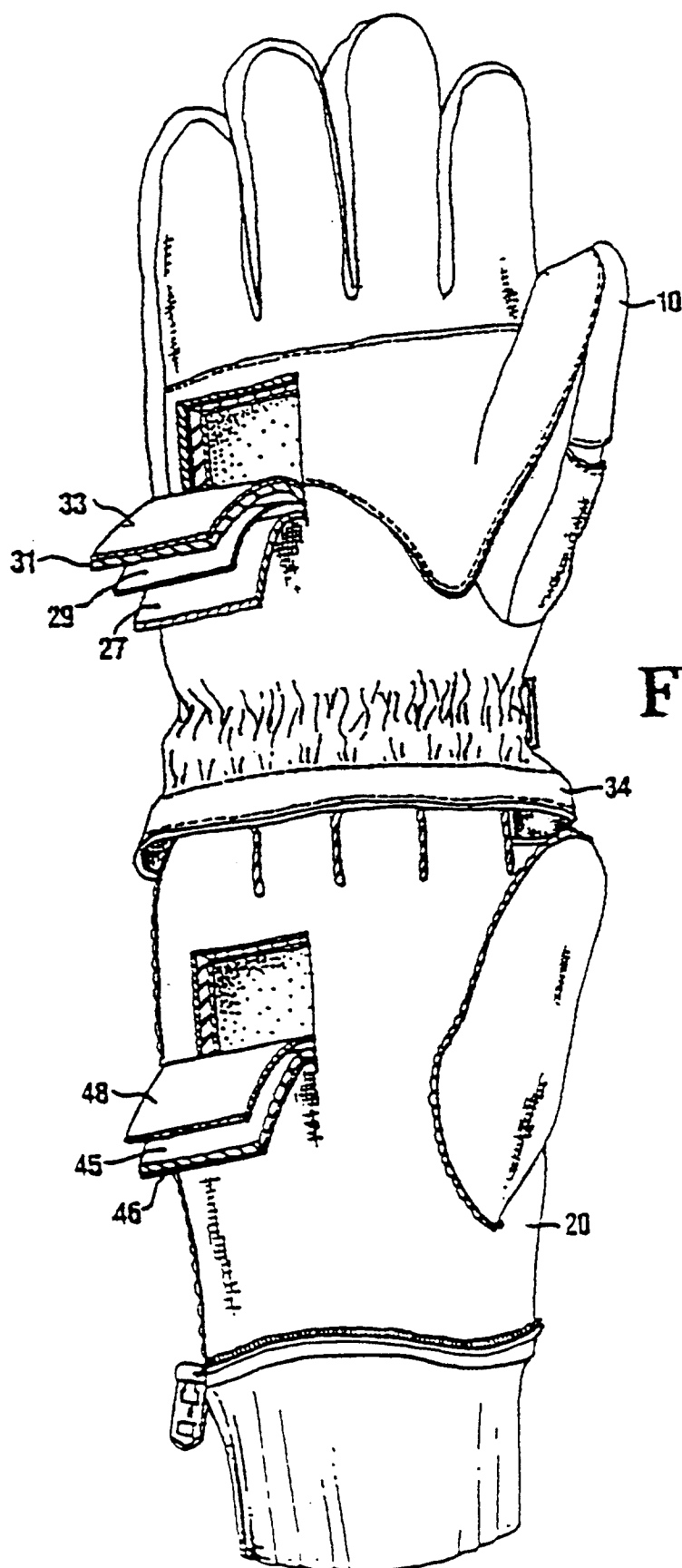


FIG. 1

FIG. 2

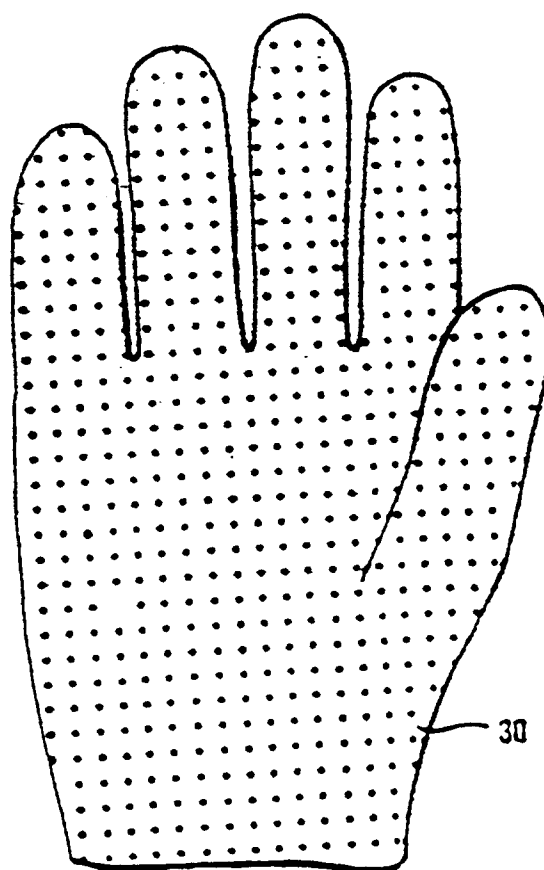
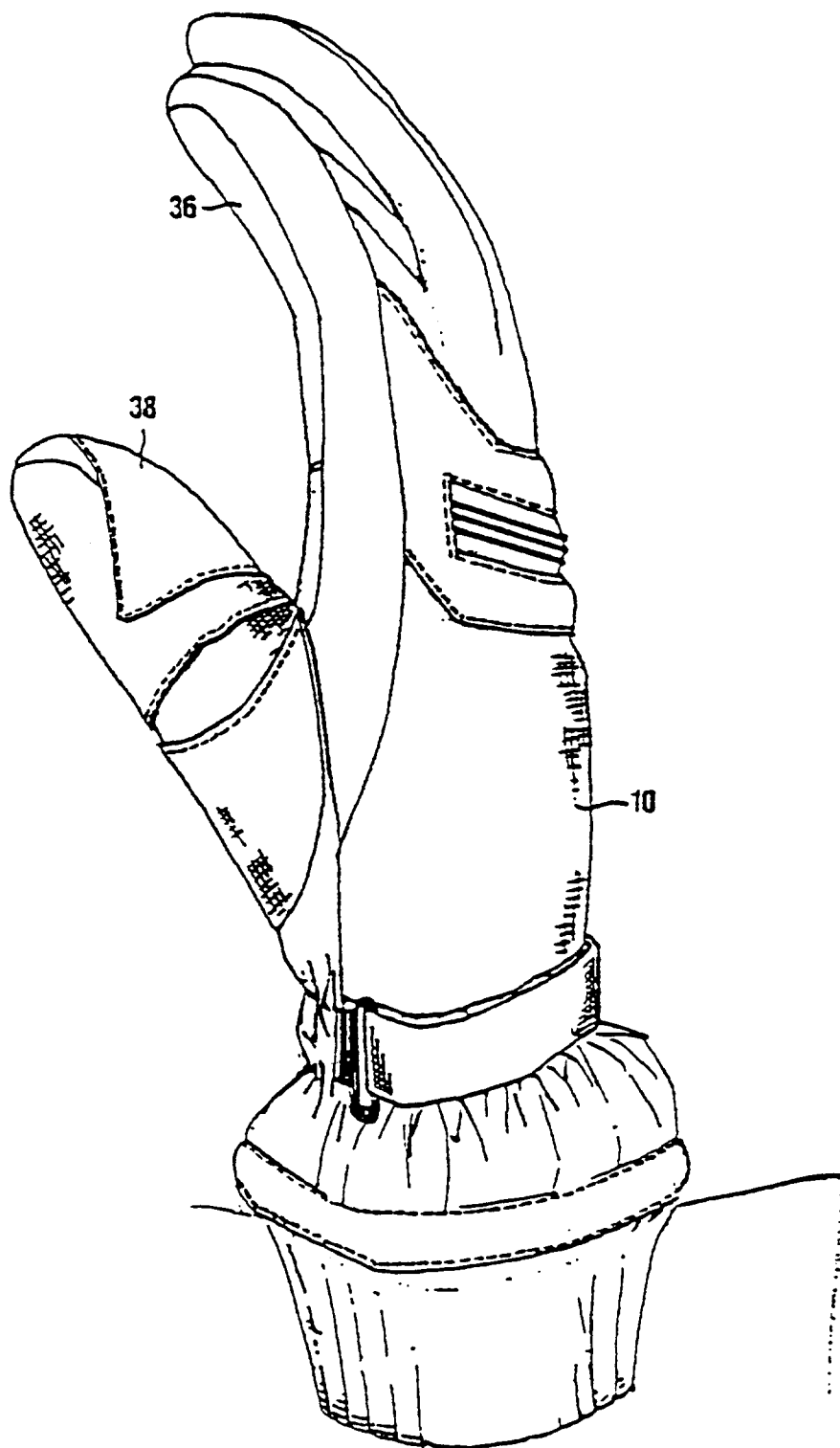


FIG. 3





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EUROPEAN SEARCH REPORT

Application Number
EP 94 20 1505

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
D,X	US-A-4 662 006 (C. ROSS, JR) * the whole document * ---	1,2,4-8	A41D19/00
A	US-A-5 167 038 (D. L. RINEHART) * figure 8 * ---	1,3	
A	WO-A-92 07480 (W.L. GORE AND ASSOCIATES, INC.) * claims 1-10 * * figure 1 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A41D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 26 October 1994	Examiner Fairbanks, S
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