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AT BE CH DE ES FR GB IT LI LU MC NL SE(71) Applicant: **FILA SPORT S.p.A.**
Viale Cesare Battisti, 26
I-13051 Biella (Vicenza) (IT)(72) Inventor: **Simonetti, Enzo**
Via Rubino, 27
I-13050 Sordevolo,
Vicenza (IT)(74) Representative: **Luksch, Giorgio, Dr.-Ing.**
Ing. A. Giambrocono & C. S.r.l.
Via Rosolino Pilo, 19/b
I-20129 Milano (IT)

(54) **Impact protection element of anatomical shape for protecting a part of the user's body, particularly of an athlete.**

(57) An impact protection element (1) for protecting a part of the user's body, particularly of an athlete, said element being a shin protector, a protection element for the arm or a part thereof, the pelvis, the femur, the spinal column or another part of the user's body, said element being of concave form at that part (2A) facing the user, and comprising a body (2) consisting of at least one layer (3) of high-rigidity composite material and at least one inner layer (4) of soft material facing the user, the body (2) being of anatomical shape so as to adapt to that part of the wearing user's body on which the protection element (1) is used.

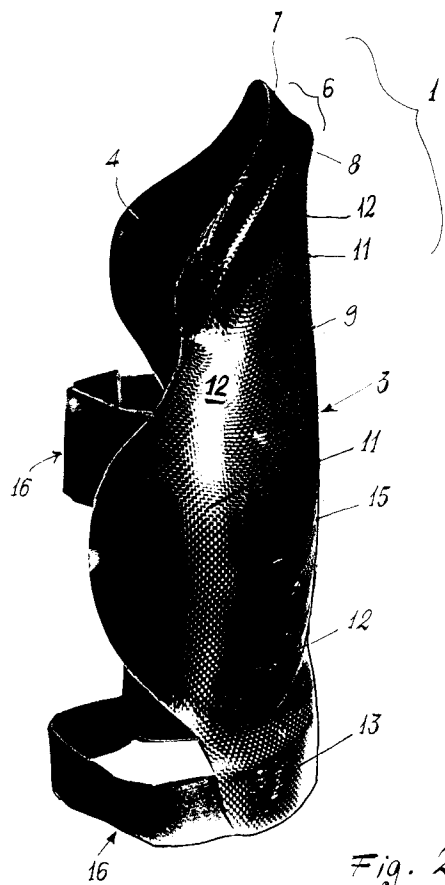


Fig. 2

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This invention relates to an impact protection element for protecting a part of the user's body, particularly of an athlete, in accordance with the introduction to the main claim.

Protection elements of the aforesaid type are known. These elements, such as shin protectors, are generally of a form deriving from a hollow half-cylinder so as to be able to be placed about the part of the body to be protected and contain it.

Said protection elements are generally constructed of soft material (which with use is however subject to considerable wear and tearing, and does not provide high protection for the part about which it is placed) or of rigid material.

Although this latter rigid type of protection element offers considerable protection to the user, it has various drawbacks. In particular, with an element of this type, such as a shin protector worn by a skier during a competition, if it undergoes impact (for example against a usual post fixed into the snow, and which the athlete is required to clear), this impact results in pressure which is distributed over the protection element only at those points at which this latter comes into contact with the impacting element (the post). The result is that the athlete senses this impact only at particular points of the leg to which the shin protector is fitted. There is therefore greater probability of muscular complications (such as small traumas) or microfractures occurring at these points, which in the long term can compromise a single competition, a whole competitive season or indeed the actual sporting career of the athlete.

An object of the present invention is to provide an element of the aforesaid type which offers greater protection to the user against impact, and which displays considerable mechanical and structural strength with time.

A further object is to provide a protection element of the aforesaid type which is lightweight and can be used either directly in contact with the user's body, or positioned on a suit worn by the user, or "embedded" within the suit itself.

A further object is to provide a protection element which can be easily attached to the suit worn by the user.

These and further objects which will be apparent to the expert of the art are attained by a protection element in accordance with the accompanying claims.

In particular, the protection element of the invention provides greater and improved protection to the user by virtue of its anatomical shape, which, in the case of localised impact against it, results in the consequent stress being distributed over a considerable (relatively speaking) surface. This means that less stress has to be withstood by the user, with lesser probability of his suffering trauma.

In addition, as its form is anatomical (the protection element therefore not comprising a smooth outer surface as in the case of known rigid elements) with a surface therefore comprising raised and depressed portions, if an object hits the protection element it withdraws from this latter substantially immediately. This is of considerable importance if the protection element is worn by a skier who collides against the posts during a competition, because by virtue of the stated "escape effect", each post withdraws from the athlete's body without his becoming penalized and retarded in his action by the friction generated between the post and the protection element during their interaction.

The present invention will be more apparent from the accompanying drawing, which is provided by way of non-limiting example and in which:

Figure 1 is a front perspective view of a shin protector formed in accordance with the invention;

Figure 2 is a view of the shin protector of Figure 1 taken from one side;

Figure 3 is a rear view of the shin protector of Figure 1; and

Figure 4 is a section on the line 4-4 of Figure 1.

With reference to said figures, a protection element according to the invention is indicated overall by 1 and is shown in the form of a shin protector. It comprises a body 2 of layer form, consisting of a first outer layer 3 and an inner layer 4, with reference to the manner in which it is used by the wearer of the shin protector 1. That part 2A of the body 2 facing the user is concave, again with reference to the manner of its use by the wearer, and is of anatomical configuration in the sense that its shape properly adapts to the features of that part of the user's body to be protected from impact.

Specifically, the layer 3 is of composite material such as glass fibre, carbon fibre or kevlar or the like. The layer can be formed using fabric produced from carbon or the like (as aforesaid) by an orthogonal weaving process or by weaving of different type (such as knitting), and resins for vacuum binding of homogeneous or differential density (as known), which take account of the structural requirements of the element 1 and of the environmental humidity and temperature conditions under which the element is produced.

The layer 4 is formed of any soft material such as sponge rubber or open or closed-cell polyurethane foam preferably of high and/or differential density.

In the embodiment shown in the figures, the shin protector 1 comprises an upper part 6 arranged to make contact with the athlete's knee and act as a deflector for the air which strikes the

athlete during the sporting activity. The part 6 comprises a shield 7 inclined to a projecting edge or rim 8 on the outer surface 9 of the layer 3. This surface is anatomically shaped as heretofore stated, to comprise projecting parts 11 and depressed parts 12 smoothly joined together. Lowerly, the protection element 1 comprises a flat projecting part forming a lower reinforcement for the element 1. The part 13 is connected to the upper part 6 by a longitudinal rib or projection 15 which reinforces the layer 3 and acts as a deflector for the air striking the user during, for example, a sporting activity such as skiing.

The layer 4 covers internally (with reference to the user wearing the element 1) nearly the whole of the layer 3 except for the part 13 thereof. Because of the presence of said layer 4 the element 1 can also be used directly in contact with the user's body or with a suit which he is wearing. For this purpose usual fasteners 16 enable the user to lock the element 1 in its position of use. The fasteners can be one-piece and partially elastic or be each in the form of two parts 17 and 18 (as in the figures) connected together by a plurality of hooks associated with one of the parts cooperating with a plurality of rings associated with the other part (or by the material known commercially as velcro).

Alternatively, the element 1 can be "embedded" within an article of clothing (such as a suit) of the user; in this case the layer 4 as described need not be associated with the layer 3 and can instead be replaced by a part of the suit itself, preferably padded, provided in a position corresponding with said layer 3.

The element 1 can also be attached to the suit worn by the user in another known manner (for example by gluing, by straps, by riveting, by sewing etc.) to hence, as in the aforescribed case, form an integral part of the article of clothing. For this purpose this latter can also be provided with usual known fastening members such as parts of press-studs 20 (shown schematically in Figure 3) which cooperate with corresponding members carried by the element 1 to provide stable and reliable but releasable connection to the suit.

An element 1 in the form of a shin protector (useful for example for skiing both at the competitive and amateur level) has been described. The element 1 can however be in the form of an impact protector for application to another part of the user's body (arm or part thereof, femur, pelvis, spine); in such a case said element can be of suitable shape and size for use on said body part and such as to be able to adapt anatomically to it, provided the aforesaid inventive characteristics as defined in the accompanying claims are maintained.

Such other embodiments are therefore to be considered as falling within the scope of the present document.

Claims

1. An impact protection element for protecting a part of the user's body, particularly of an athlete, said element being a shin protector, a protection element for the arm or a part thereof, the pelvis, the femur, the spinal column or another part of the user's body, said element being of concave form at that part facing the user, characterised by comprising a body (2) consisting of at least one outer layer (3) of high-rigidity composite material and at least one inner layer (4) of soft material facing the user, the body (2) being of anatomical shape so as to adapt to that part of the wearing user's body on which the protection element (1) is used.
2. A protection element as claimed in claim 1, characterised in that the outer layer (3) is formed of carbon or glass fibres or similar material.
3. A protection element as claimed in claim 1, characterised in that the inner layer (4) is of polyurethane foam preferably of high density and/or differential density.
4. A protection element as claimed in claim 1, characterised in that the inner layer (4) is of sponge rubber.
5. A protection element as claimed in claim 1, characterised by comprising, on the outer surface (9) of the outer layer (3), projections (6, 13) in end positions and raised stiffening ribs (8, 15) on said surface.
6. A protection element as claimed in claim 1, characterised by comprising means (16) for its connection to the user's body.
7. A protection element as claimed in claim 1, characterised by being removably associated with an article of sports clothing worn by the user.
8. A protection element as claimed in claim 7, characterised by being provided, on the inner part (2A) of its body (2), with members (20) for fastening the element to corresponding members associated with the article of clothing worn by the user.

9. A protection element as claimed in claim 1, characterised by being permanently associated with an article of sports clothing worn by the user.

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10. A protection element as claimed in claim 1, characterised by being embedded within the article of clothing worn by the user, the inner layer (4) of its body (2) consisting at least of a part of the article of clothing itself.

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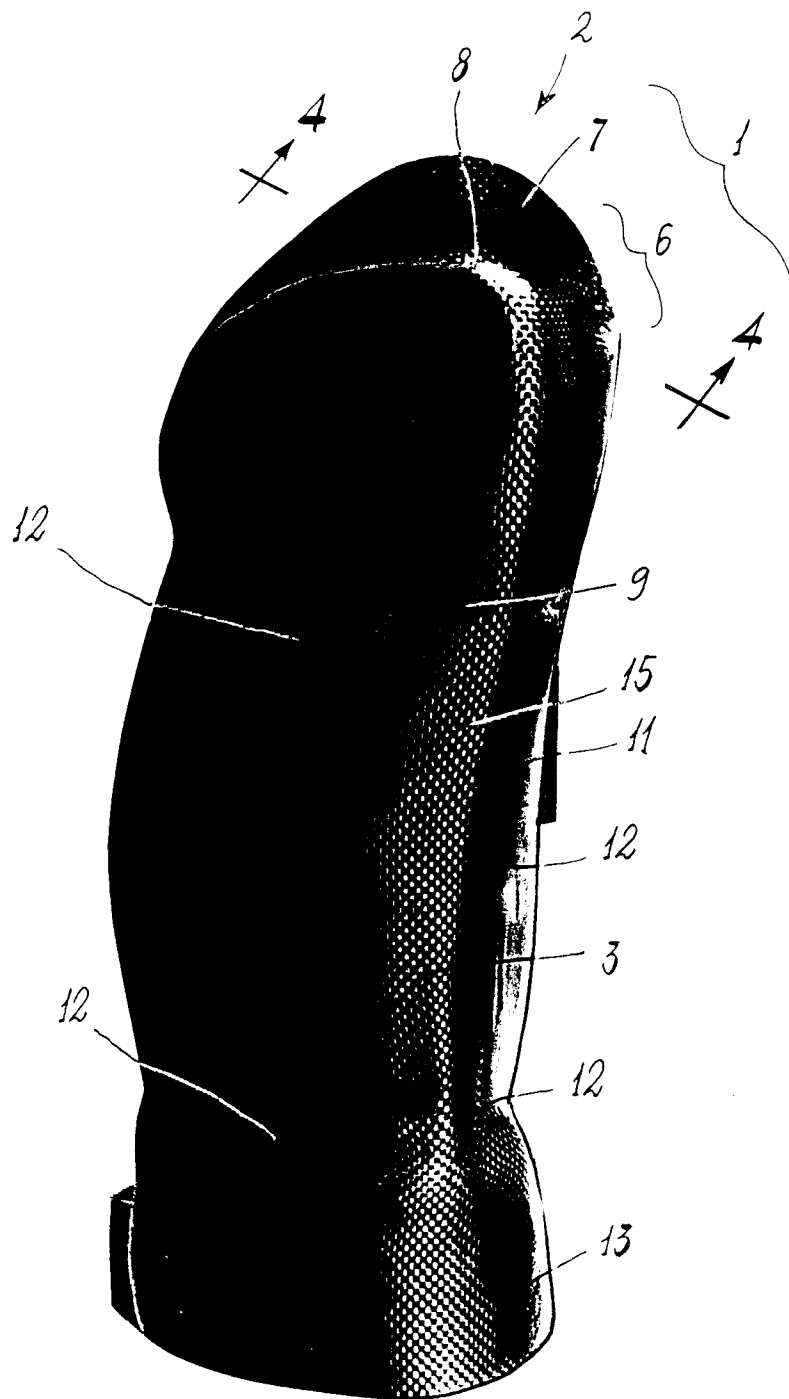


Fig. 1

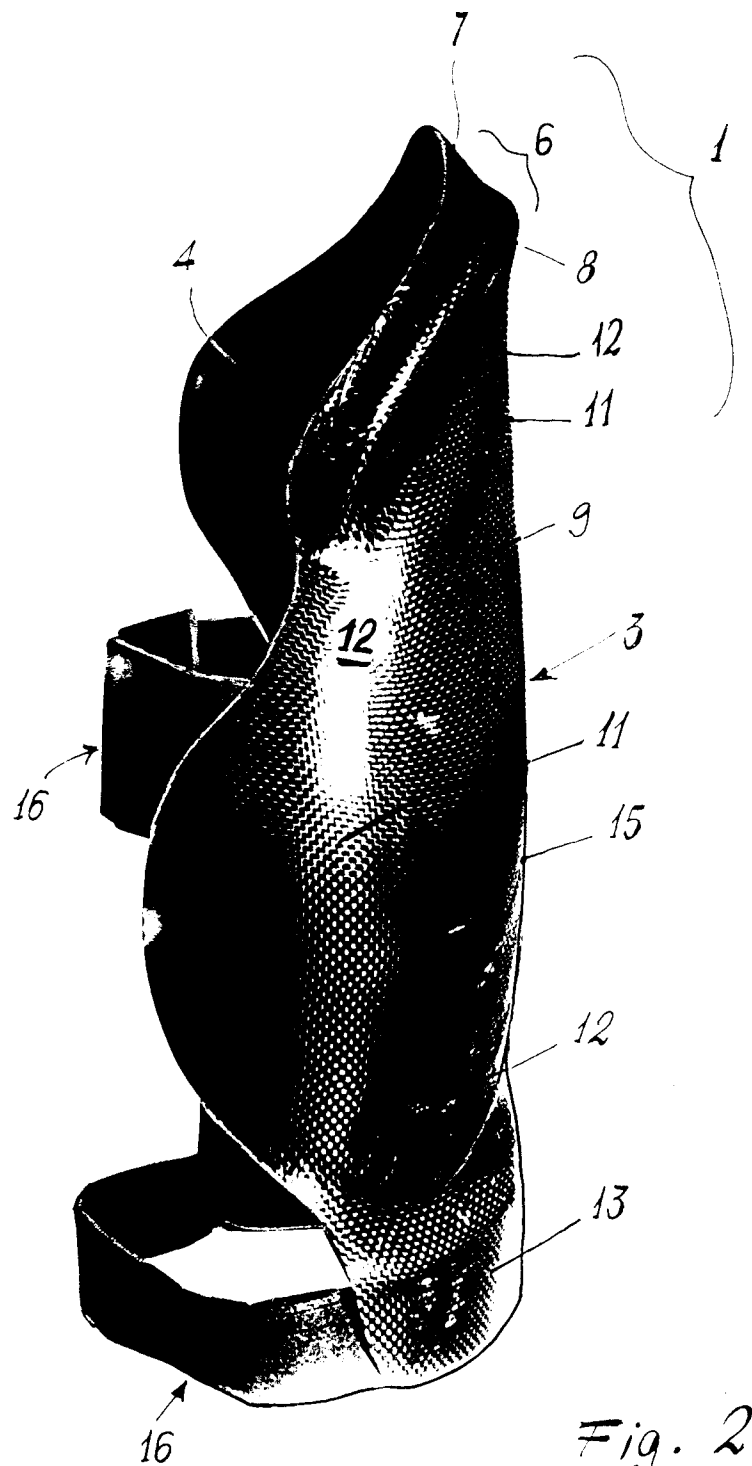
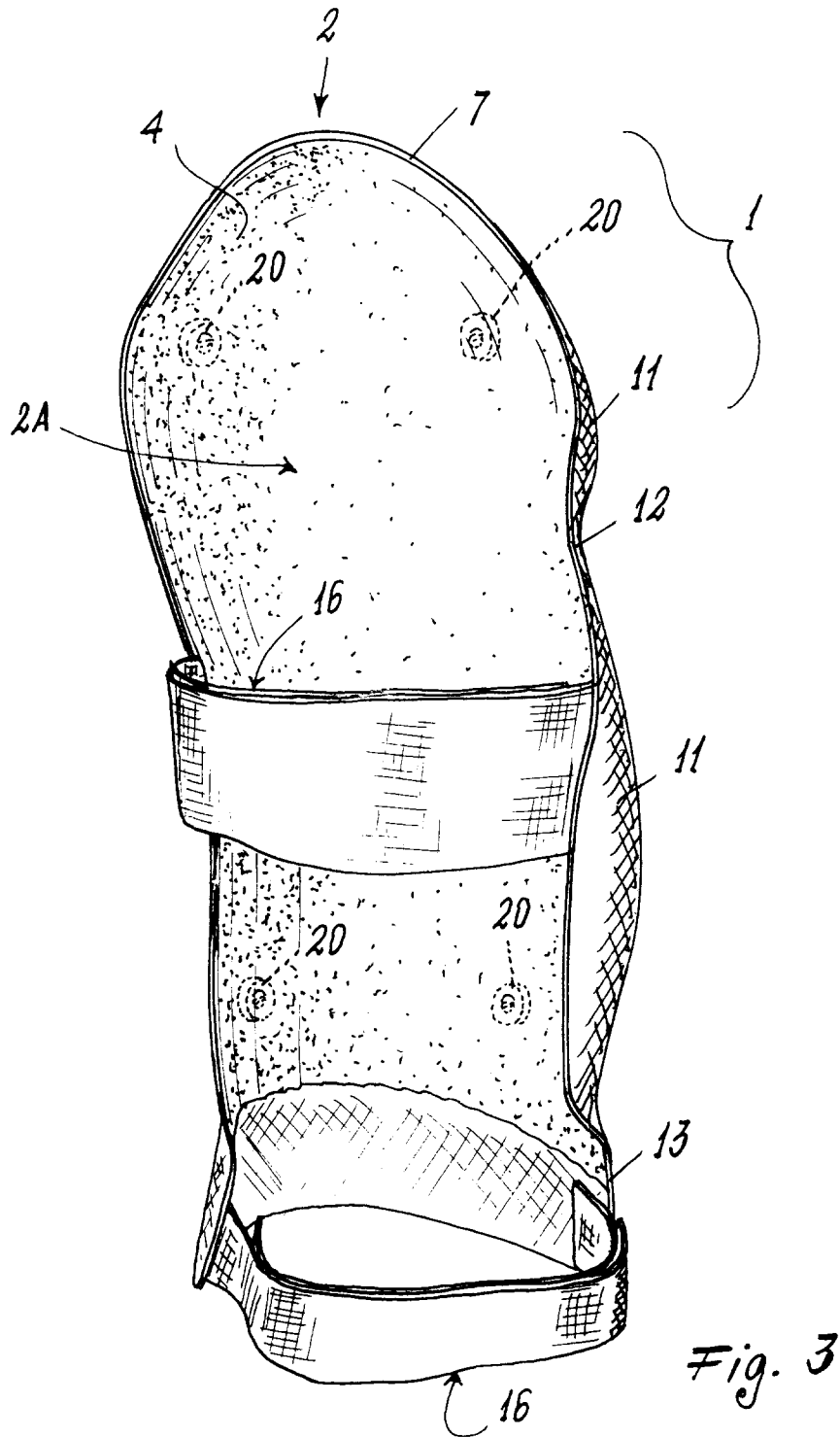


Fig. 2



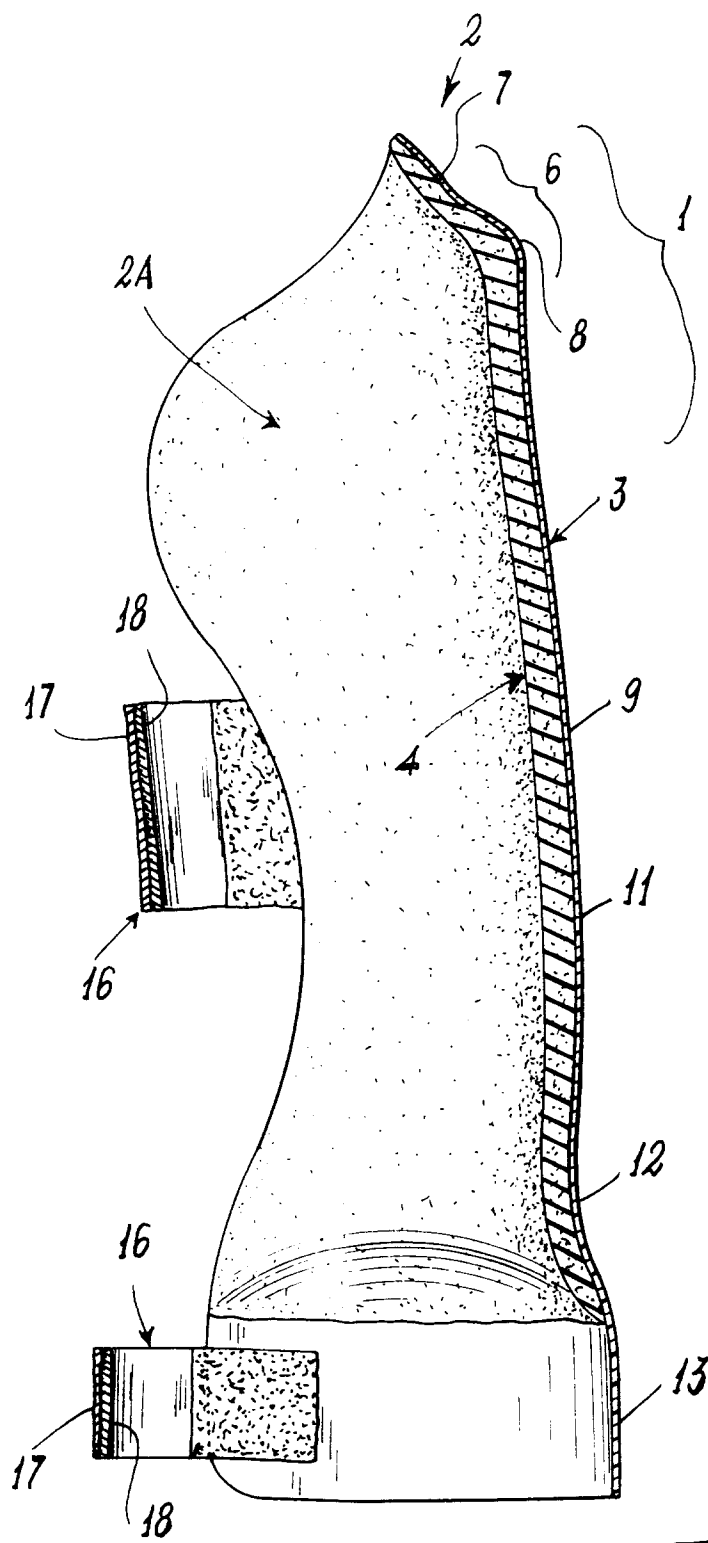


Fig. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 93 11 7107

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)
X	DE-A-38 04 504 (W. NIERHAUS) * the whole document * ---	1,6	A63B71/08 A41D13/00
X	DE-U-87 08 392 (D. FILMER) * page 2, line 13 - line 15 * * page 3, line 7 - line 25 * * claims 1-4,6-8,10,11 * * figures 1,5-7 * ---	1-3,7,9, 10	
X	US-A-4 688 269 (SEIICHI MAESHIMA) * the whole document * -----	1,2,4, 7-9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			A63B A41D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 December 1994	Examiner FAIRBANKS, S
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