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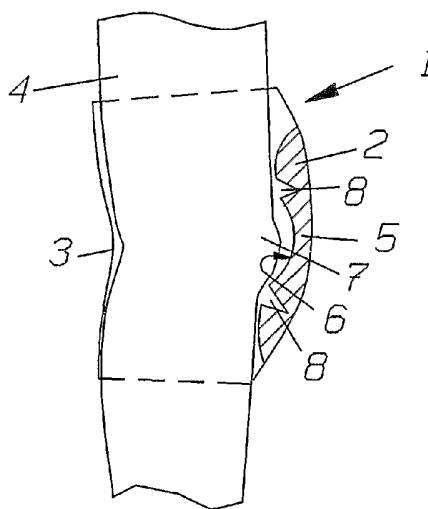
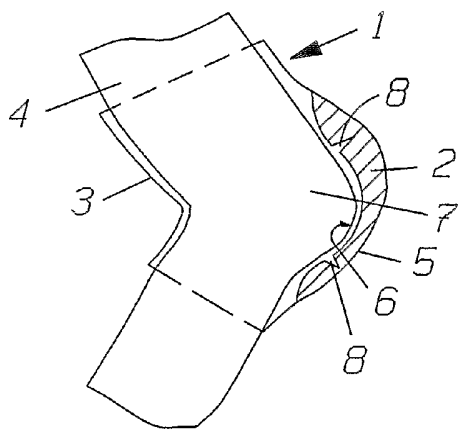
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ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: JOINT PROTECTOR AND PROTECTIVE PAD THEREFORE



(57) Abstract: A joint protector (1) for a knee or an elbow including an attachment portion (3) for enclosing the area around the joint with a cut-out into which a cushioning protective pad (2) is attached, wherein the protective pad is provided with grooves (8) for forming sections for increasing its flexibility. The protective pad (2) has, essentially centrally, a positioning portion (5) with an inwardly directed, adapted recess (6) for enclosing, and positioning of the protector relative to, an extreme portion of the joint (i.e. the knee cap, the elbow tip etc). The grooves (8) are turned inwardly for forming a flexible adaptation portion (14, 15...) in a peripheral area with respect to the positioning portion (5). The invention also relates to a protective pad (2).

JOINT PROTECTOR AND PROTECTIVE PAD THEREFORE**Field of the invention**

The invention concerns a joint protector according to the
5 preamble of claim 1. It also concerns a protective pad
therefore.

Description of background art

Such a joint protector in the form of a knee protector is
10 previously known for sportsmen, in particular for handball
players. In this previously known knee protector the
protective pad, in order to increase its adjustability, is
provided with outwardly directed pillow-shaped sections which
are separated by grooves that extend down to the bottom of the
15 cushioning layer, which thereby is divided into said sections.

Outwardly, also covering the sides of the grooves, the
protective pad is laminated with a wear-resistant textile
material. Inwardly, against the knee, the protective pad is
20 essentially smooth and provided with an elastic textile
material.

The known knee protector functions generally well but in
certain situations impacts against the knee occurring in the
25 region of the grooves between the sections tend to be less
well cushioned and might therefore affect the knee, since
there is no essential cushioning provided in these regions.
Further, the knee protector may be experienced as non-distinct
and rigid by a user and thereby slide on the knee in such a
30 way that in use it might be moved from an optimal position.

As examples of background art can be mentioned:

US-A-50 77 837, which concerns a joint protector having a tubular attachment portion and a protective pad sewn onto its outside. This document forms the preamble of the annexed independent claims.

5 FR-A1-27 97 154, which concerns a knee pad for knee-standing work. This pad is intended to be temporarily inserted into a pocket in a trouser-leg and is to be considered as a passive, static knee protector.

10 US-A-15 25 298, which describes a knee protector with a pad, a felt spiral and elastic leg bands.

FR-A3-28 15 519, which relates to a protector in connection with an article of clothing, in particular for persons working standing on their knees, and for distributing pressure during a long time. Also this protector is a static, passive
15 protector.

Aim and most important features of the invention

It is the aim of the present invention to improve an active joint protector according to the background art so that the
20 drawbacks thereof are avoided or at least reduced.

These aims are obtained according to the invention in a joint protector as above through the features of the characterising portion of claim 1.
25

Hereby is provided an active protection for sportsmen and for other active users, such as e.g. patients during rehabilitation, with means for secure positioning of the protector around the extreme portion of the respective joint, whereby is meant the knee cap in case of a knee protector and
30 the elbow tip in case of an elbow protector. It is not excluded that other joints can be protected with a joint protector according to the invention. By having the sectioning

arranged such that the grooves delimiting the sections are turned inside against the joint, a number of advantages are obtained such as retained or even increased flexibility of the joint protector in comparison with a joint protector according to the background art.

Further, the protective pad will become more tight and it is avoided that regions occur in the area of the protective pad that lack protective and cushioning material. Further the grooves are closing when bending the pad, which contributes to the enhanced cushioning effect in connection with bending the respective joint.

The construction also simplifies the manufacturing process since a protective pad according to the invention is easy to form to the specific protector that is intended, and in particular to the vaulted shape it is intended to have in the completed protector. This simplifies the procedure of sewing the protecting pad into the attachment portion. It could be mentioned that the dimensions of the included components are preferably measured such that the protective pad in applied position in the protector, typically will be subjected to a compressive force radially from the outside of the surrounding attachment portion which contributes to the desired vaulted shape of the protective pad.

The recess in the positioning portion is adapted for the body part to be protected. A knee protector according to the invention thus preferably is provided with a recess having an even, rounded, oval configuration corresponding to the shape of a normal knee cap, whereas an elbow protector according to the invention is of course provided with a differently shaped

recess, typically allowing reception of the relatively edged portions at the elbow tip.

5 An active protector, which is used during movements of the user, in combination with the positioning portion brings along the great advantage that the user becomes unaware of the protector, which is particularly important in dynamic sports situations, for example during a handball match, since thereby the user can have his entire focus on the game. The user will
10 sense conscientiously as well as instinctively that the protector is in the correct position.

Older protectors, however, fit badly during dynamic situations, i.a. since the movements of the joint and the
15 expansion and contraction of adjacent groups of muscles result in an interrupted tendency of dislocating the protector from its desired position. This is on the one hand uncomfortable and forces the user to control and adapt the position of the protector over time, on the other hand it results in increased
20 risk of injuries since the protector is often incorrectly positioned. The protector according to the invention is therefore superior to previous protectors in connection with blows, falls and during movement in general, since the protector, because of its construction becomes flexible and is
25 experienced as easy to carry and not restraining.

According to the invention the condition for the positioning to function is realized in that the protective pad is applied inside a cut-out in the tubular attachment portion, which is
30 intended to be attached tightly against the region around the joint, so that the recess of the pad is directly positioned and fixed over the extreme portion of the joint.

As a contrast it could be referred to the background art, wherein either a tubular attachment portion lacks a cut-out, or a protector or a pad, respectively, is intended to be used in connection with a garment. The recesses providing in such previously known protectors will not result in that these protectors have a function which is achieved in a protector according to the invention.

The protectors are preferably produced in different sizes in order to guarantee fit for users of different sizes.

When the positioning portion is shaped without sections, its form stability will be increased and the positioning function better than if it would have been sectioned. It could be noted that the positioning portion further in principle does not need to be sectioned since it is typically adapted for a body part which is unchanged at the bending of the joint.

Corresponding advantages are achieved in a protective pad for such a protector.

Further advantages are achieved with the features of the dependent claims, which will be evident from the following detailed description.

Brief description of drawings

The invention will now be described further at the background of an embodiment and with reference to the annexed drawings, wherein:

Fig. 1 shows a joint protector according to the invention in the form of a knee protector for sporting purposes attached to the leg of a sportsman,

Fig. 2 shows the protector of fig. 1 in section with a bent knee joint,

Fig. 3 shows the protector in fig. 1 in section with a
5 straight knee joint.

Fig. 4 shows a protective pad for a joint protector according to the invention in a plain view, and

10 Fig. 5 shows the protective pad in fig. 4 in section along the line V-V.

Description of embodiment

In fig. 1 is shown a joint protector according to the
15 invention in the form of a knee protector for sporting purposes such as for handball, wherein the joint protector is generally indicated with 1. The joint protector 1 includes a protective pad 2, which at 13 is sewn onto an attachment portion 3 in order to form an integral joint protector,
20 wherein the attachment portion 3 is provided with a cut-out in the area where the protective pad 2 is sewn. 4 denotes a leg of a carrier of the protector.

In fig. 2 the protector 1 is shown in section on a bent knee
25 joint, whereby it is illustrated that the protector lies well against and has the capacity of protecting the knee in this bent state. The protective pad 2 has essentially centrally a positioning portion 5, which is provided with a recess 6, which is turned against the knee joint and which is shaped in
30 order to enclose the extreme portion of the joint with good fit, i.e. in this case the knee cap 7.

Peripheral portions of the protective pad are shown on each side of the positioning portion 5 and are separated there from through grooves 8, which in this bent state of the knee are essentially closed so that the peripheral sections of the protective pad at least almost lies against the respective side of the positioning portion 5.

In fig. 3 the knee protector of fig. 2 is shown in section, however, on a straight joint, whereby this figure shows that the positioning portion 5 has a continued fit against the knee cap and that the peripherally positioned sections on each side of the positioning portion 5 are still lying well against the area around the knee, now however with the respective groove 8 in an open state such that the pad in this section has a straighter extension.

In combination with the attachment portion, which is shaped such that a certain attachment pressure is exerted against the area of the joint, is hereby achieved through the joint protector according to the invention a defined using position with a secure positioning of the joint protector because of the shape of the positioning portion 5 together with a good cushioning in the bent as well as the straight position of the knee.

25

In particular it should be stressed that with a joint protector according to the invention is provided a very good adjustment to the joint in question, so that the protector can be optimized such that the parts of the joint area that are desired to be protected also indeed can be protected. Hereby the pad can be made smaller or thinner than is the case according to the previously known art with maintained or even enhanced cushioning.

The invention gives the possibility of a very good fit, which in turn results in that the joint protector functions very well in movement situations, and in particular when sideways directed forces and shearing forces are directed against a protector.

The protector according to the invention is also experienced as more comfortable than previous protectors. I.a. since the construction results in larger areas of contact against the body parts and thereby reduced surface pressure on exposed regions. The protector is therefore flexible, comfortable as well as safe.

In Fig. 4 a protective pad 2 is shown for integration into a joint protector according to the invention, whereby is illustrated the essentially square configuration of the positioning portion 5 with possibly somewhat rounded at least upper and lower edges. The recess 6 is essentially round but can be shaped for adaptation to the extreme portion of the joint in question.

It is also within the scope of the invention to tailor-make this recess, as besides also the rest of the protector, for adaptation to an individual user.

14 and 15 indicate two of the many cushion-like sections of the pad, and it could be mentioned that the section 15 is extended in order to provide protection of the sensitive tendon attachment at the front side of the lower leg under the knee cap. 16 indicates a fastening portion which is intended to be sewn onto the cut-out in the attachment portion (see detail 3 in Fig. 1).

In Fig. 5 is shown a section through the protective pad along the line V-V in Fig. 4. The protective pad is here shown as a laminated unit, which simplifies manufacture. Further, the protective pad is radially outwardly narrowing in a smooth manner which gives a sense of comfort for the carrier.

The cushioning layer 10 of the protective pad is preferably made from a cellular material of natural or synthetic rubber, which is per se known within the field of the invention.

10 Towards the outside of the protector, the protective pad 2 is provided with a wear-resistant, flexible textile layer 11, which preferably includes woven-in yarns of KEVLAR® or similar wear-resistant materials.

15 On the inside of the protective pad, the upper side in Fig. 5, there is an elastic synthetic textile material fixedly laminated, which as an example can be comprised of LYCRA® or any other elastic, jersey-knitted synthetic material. Also other similar materials can of course be considered. In this connection it could be mentioned that the tubular attachment

20 portion is preferably manufactured from a material which is per se known within the field, as an example a layer of neoprene rubber covered with an elastic textile on the outside as well as on the inside.

25

In Fig. 5 is shown with full lines the extension of the thickness of the protective pad as being reduced in the area of the recess 6. This gives, however, reduced security from a protection point of view, wherefore the cushioning layer

30 should be extended such that the outer surface of the protective pad instead in general follows the interrupted line 17. This way excellent cushioning is obtained also against blows in the area of the recess 6.

It should be noted that the pad is shaped with grooves 8 also essentially perpendicular to the grooves 8 in Figs. 2, 3 and 4, in order to allow bending thereof so that a double curved structure is formed which is well attached to and covers the sensitive portions of the joint. All sectionings are adapted so as to adjust the pad the best way to the physical shape of the respective joint and its dynamic movements.

The invention can be modified within the scope of the annexed claims. As an example the sections of the protective pad can be shaped differently. It is as an example not excluded that the positioning portion is sectioned even if this is not preferred.

The adaptation portion may be shaped differently and be brought to lie against and enclose larger or smaller portions of adjacent portions of the joint. The shape of the sections are made so that they follow the anatomic structures of the joint as much as possible throughout the whole course of movement of the joint, from straight to maximum bent. The shape can also be such that the adaptation portion does not completely surround the positioning portion even if this is not preferred.

Joint protectors according to the invention are well suited for sporting purposes, but it is not excluded that they are used for e.g. playing children and youngsters. Even if the protector is primarily designed for dynamic users such as sportsmen, it can of course be advantageously used also by professionals, as falling protectors for older people, in rehabilitation etcetera.

CLAIMS

1. Joint protector (1) for a joint such as a knee or an elbow including a flexible, tubular attachment portion (3) for enclosing the area around the joint and a cushioning protective pad (2), permanently attached thereon, for forming an integral unitary protector for attachment onto the joint so that the protective pad (2) covers a part of the joint which is able to form an acute angle,

characterized in

- that the attachment portion is provided with a cut-out for the protective pad,
- that the protective pad (2), essentially centrally, has a positioning portion (5) with an inwardly directed, adapted recess (6) for enclosing, and positioning of the protector relative to, an extreme portion of the joint (i.e. the knee cap, the elbow tip etc), and
- that the protective pad is provided with grooves (8) for forming sections for increasing its flexibility, wherein said grooves (8) are turned inwardly for forming a flexible adaptation portion (14, 15) having inwardly directed sections in a peripheral area with respect to the positioning portion (5).

2. Joint protector according to claim 1, **characterised in** that the positioning portion (5) is not sectioned.

3. Joint protector according to claim 1 or 2, **characterized in** that the positioning portion (5) is essentially square, possibly having outwardly slightly rounded sides.

4. Joint protector according to claim 1, 2 or 3,

characterized in that the protective pad (2) is a radially outwardly narrowing laminated unit.

5 5. Joint protector according to any of the previous claims,
characterized in that the protective pad (2) has an outer flexible, wear-resistant textile layer (11).

10 6. Joint protector according to any of the previous claims,
characterized in that the protective pad (2) has a cushioning intermediate layer (10) of a cellular material of natural or synthetic rubber.

15 7. Joint protector according to any of the previous claims,
characterized in that the protective pad (2) has an inner layer (12) of an elastic synthetic textile material.

20 8. Joint protector according to any of the previous claims,
characterized in that the grooves (8) are widening in a direction from their bottoms.

9. Joint protector according to any of the previous claims,
characterized in that the protective pad (2) is sewn to the attachment portion (3).

25 10. Joint protector according to any of the previous claims,
characterized in that the protective pad (2) is shaped as an inverted drop as seen in a using position.

30 11. Joint protector according to any of the previous claims,
characterized in that the positioning portion (5) is entirely surrounded by the adaptation portion (14, 15...).

12. Joint protector according to any of the previous claims, **characterized in** that the protective pad (2) has a peripheral fastening portion (16) to be sewn to the attachment portion (3).

5

13. Protective pad (2) for a joint protector (1) for a joint such as a knee or an elbow with a flexible, tube-shaped attachment portion (3) for enclosing an area around the joint, with a cut-out wherein the cushioning protective pad (2) is intended to be permanently attached for forming an integral, unitary protector for attachment onto a joint such that the protective pad (2) covers a part of the joint which is able to form an acute angle, **characterized in**

10

- that the protective pad (2) essentially centrally has a positioning portion (5) with an adapted recess (6) for enclosing, and positioning the pad and thereby the protector relative to, an extreme portion of the joint (i.e. the knee cap/the elbow tip etc.), and

15

- that the protective pad is provided with grooves (8) for forming sections for increasing its flexibility, whereby said grooves (8) are directed in the same direction as the recess (6) for forming a flexible adaptation portion (14, 15...) with inwardly directed sections in a peripheral region with respect to the positioning portion (5).

20

25

14. Pad according to claim 13, **characterized in** that the positioning portion (5) is not sectioned.

15. Pad according to claim 13 or 14, **characterized in** that the positioning portion (5) is essentially square, possibly with outwardly, slightly rounded sides.

30

16. Pad according to claim 13, 14 or 15, **characterized in** that it is a radially outwardly narrowing, laminated unit.

17. Pad according to any of the previous claims 13-16,
5 **characterized in** that it has an outer flexible, wear-resistant textile layer (11).

18. Pad according to any of the previous claims 13-17,
10 **characterized in** that it has a cushioning intermediate layer (10) of a cellular material of natural or synthetic rubber.

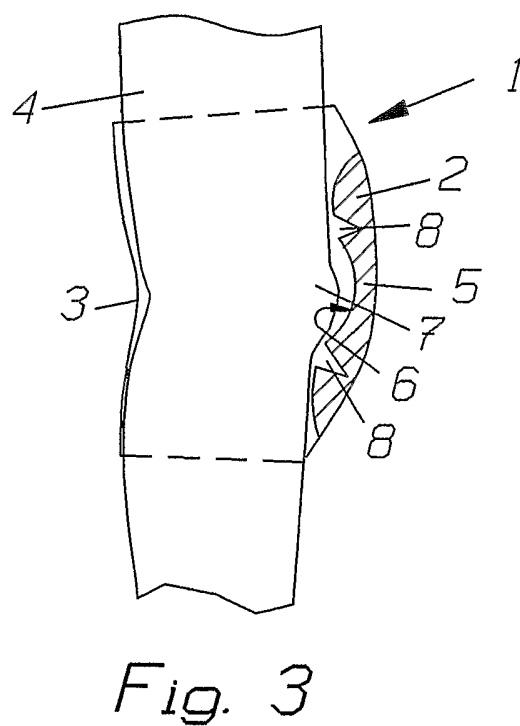
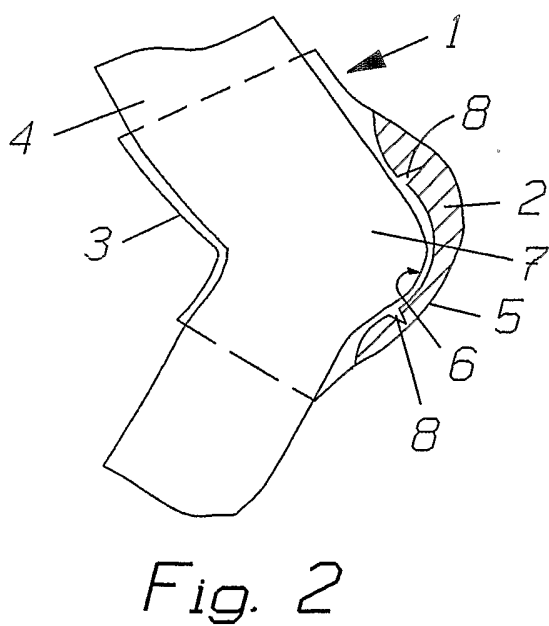
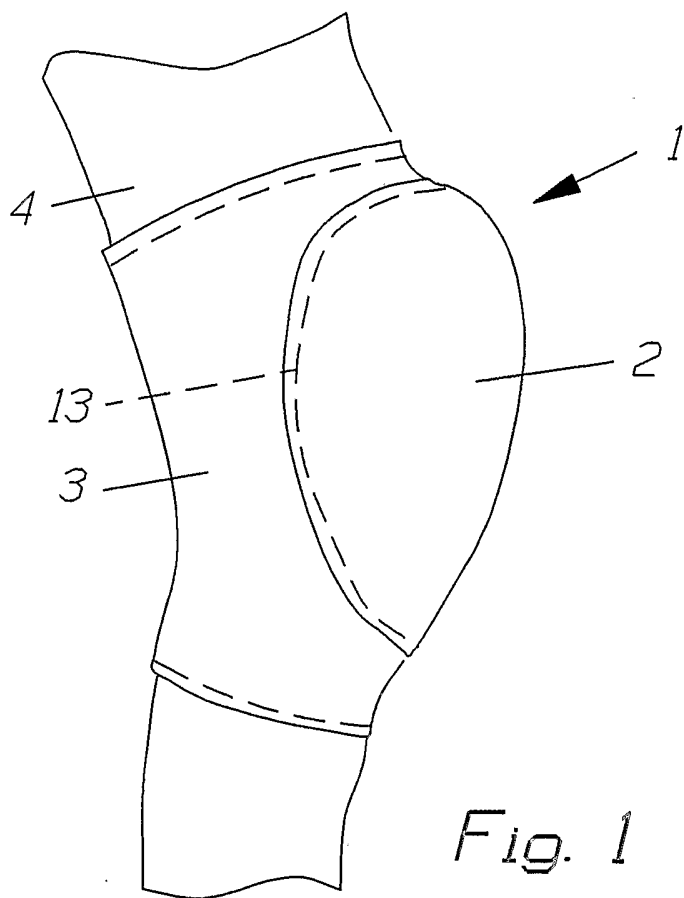
19. Pad according to any of the previous claims 13-18,
15 **characterized in** that it has an inner layer (12) of an elastic synthetic textile material.

20. Pad according to any of the previous claims 13-19,
characterized in that the grooves (8) are widening in a direction from their bottoms.

21. Pad according to any of the previous claims 13-20,
20 **characterized in** that it is formed as an inverted drop as seen in a using position.

22. Pad according to any of the previous claims 13-21,
25 **characterized in** that it has a fastening portion (16) to be sewn onto the attachment portion (3).

1/2



2/2

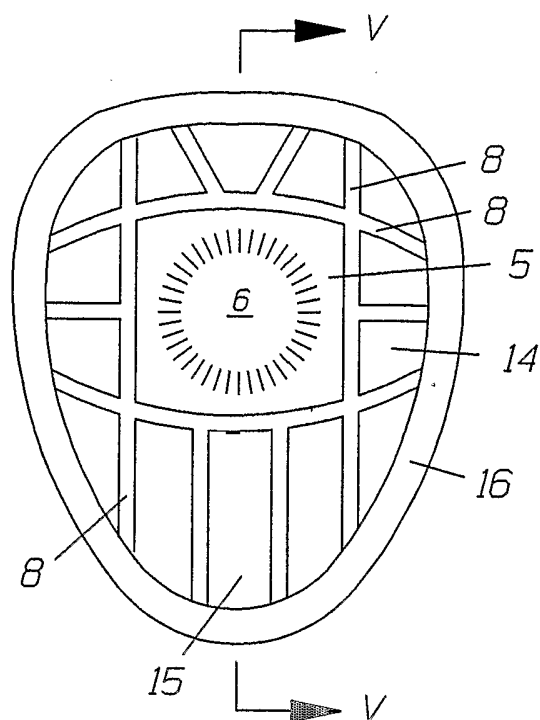


Fig. 4

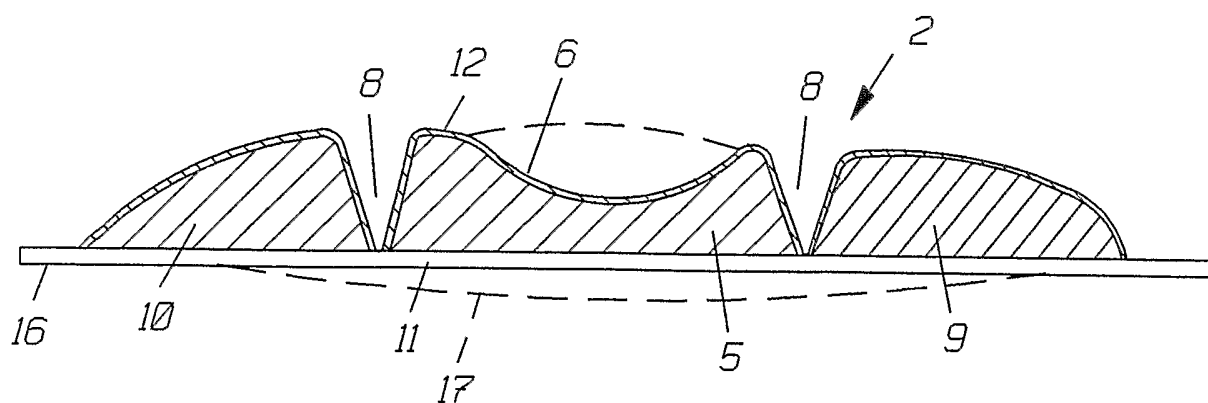


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A41D 13/06, A41D 13/08, A63B 71/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A41D, A63B, A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5077837 A (W.R. MEISTRELL), 7 January 1992 (07.01.1992), column 1, line 5 - line 13; column 1, line 51 - line 56; column 2, line 6 - line 52, column 3, line 4 - line 8, figures 1,4 ---	1-22
A	FR 2797154 A1 (INSTITUT NATIONAL DE RECHERCHE ET DE SECURITE POUR LA PREVENTION DES ACCIDENTS DU TRAVAIL ET DES MALADIES PROFESSIONNELLES), 9 February 2001 (09.02.2001), page 2, line 18 - page 3; page 5, line 18 - line 24; page 8, line 6 - line 8, page 10, line 14 - line 28 ---	1-22

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 2004/000554

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 1525298 A (T.J. HARTMAN), 3 February 1925 (03.02.1925), page 1, line 9 - line 38; page 1, line 53 - line 80, figures 1-4 --	1-22
A	US 5255391 A (N.D. LEVINE), 26 October 1993 (26.10.1993), column 3, line 6 - line 12; column 3, line 36 - line 61, figures 1-3 --	1-22
A	US 4796303 A (W.D. ATWATER), 10 January 1989 (10.01.1989), column 1, line 41 - column 2, line 3, figures 1-6 --	1-22
A	US 6279160 B1 (C.-C. CHEN), 28 August 2001 (28.08.2001), column 2, line 37 - column 3, line 40, figures 1-8 --	1-22
A	WO 9619124 A1 (KNEEON AUSTRALIA PTY. LIMITED), 26 June 1996 (26.06.1996), page 2, line 12 - page 3, line 11; page 5, line 18 - line 21, figure 2 --	1-22
A	FR 2815519 A3 (ETABLISSEMENTS WEILLE ET FILS), 26 April 2002 (26.04.2002), page 4, line 33 - page 6, line 17; page 9, line 6 - line 22; page 14, line 9 - page 15, line 13, figures 1,2,5 --	1-3,5-7,11, 13-15,17-19
A	WO 9418861 A1 (VIIIO, M.), 1 Sept 1994 (01.09.1994), page 2, line 15 - line 36; page 4, line 4 - page 5, line 2; page 6, line 26 - line 29, figures 1-3, abstract -- -----	8,20

INTERNATIONAL SEARCH REPORT

Information on patent family members

30/04/2004

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PCT/SE 2004/000554

US	5077837	A	07/01/1992	NONE		
FR	2797154	A1	09/02/2001	FR	2797153 A,B	09/02/2001
US	1525298	A	03/02/1925	NONE		
US	5255391	A	26/10/1993	NONE		
US	4796303	A	10/01/1989	NONE		
US	6279160	B1	28/08/2001	NONE		
WO	9619124	A1	26/06/1996	AU	737497 B	23/08/2001
				AU	4293396 A	10/07/1996
				AU	PN024894 D	00/00/0000
FR	2815519	A3	26/04/2002	NONE		
WO	9418861	A1	01/09/1994	SE	9300656 A	27/08/1994