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**Declaration under Rule 4.17:**

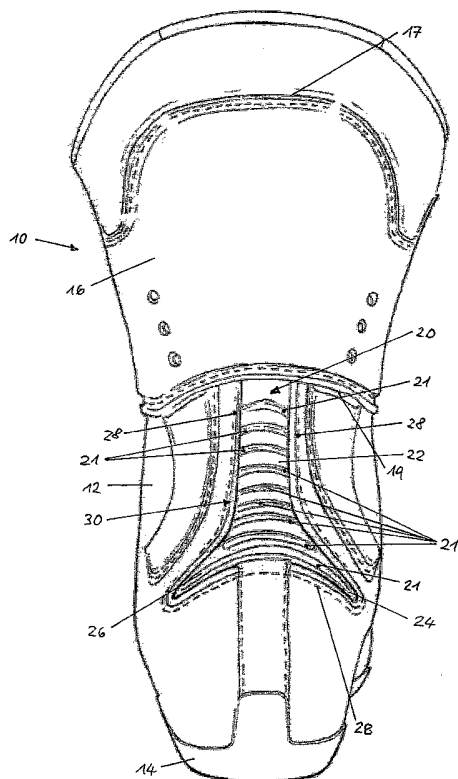
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(54) Title: INNER LINING SHOE FOR SPORT FOOTWEAR HAVING SUBSTANTIALLY RIGID SHELL AND LEG-PIECE



(57) Abstract: Inner lining shoe (10) of the front type intended for use in conjunction with ski boots and other articles of footwear generally associated to sports gear, said inner lining shoe comprising a vamp portion (12) and a sole (14) attached thereto. At least on the part of the vamp portion (12) corresponding to the Achilles tendon (A) of the wearer's foot (P) there is provided an aperture (30) plugged with at least a corresponding insert (20) made of a material that is softer and has a greater elasticity than the material of the parts of said vamp portion (12) other than the one where said aperture (30) is provided. The air pockets generally forming in state-of-art boots between said inner lining shoe (10) and said shell forming the external structure of the boot are thereby eliminated.



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## INNER LINING SHOE FOR SPORT FOOTWEAR HAVING SUBSTANTIALLY RIGID SHELL AND LEG-PIECE

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### DESCRIPTION

The present invention refers to an inner lining shoe as used in ski boots and other articles of footwear intended to be associated to various sports gear (such as the ones used in association with in-line skates, as well as the ones used in association with snowboards) which are provided with an external structure comprising a lower shell and a sometimes articulated leg-piece, both of which are made of substantially rigid plastic materials.

Such inner lining shoes are generally required to comply with two basic, to some extent mutually clashing conditions that are also to be seen in connection with the peculiar characteristics of the above-mentioned external structure of the boot, i.e. they have to :

-allow for the foot to most smoothly slip into the lining shoe itself and. as a result, the boot, and

- be such as to ensure that the commands, which – starting from the leg or the foot of the skier or skater – reach the sports gear associated to the boot, are transferred as accurately and effectively as possible thereto.

Two basic type of inner lining shoes are generally known in the art, i.e. the front entry type and the rear entry one. As largely known in the art, an inner lining shoe of the first type – which the present invention refers to, actually – is provided with a front slip-in aperture with two side flaps opening apart from each other and a tongue provided therebelow – see for example the disclosure in EP-A-427 321.

A drawback that is frequently found in this type of shoe lies in the fact that its construction is not such as to effectively ensure full adherence thereof to the shell of the external structure of the boot, owing to both the materials chosen for use in making said inner lining shoes being generally not fully up to their task and the circumstance that it is in fact quite difficult – if not plainly impossible – for the actual physical condition of the wearer's foot to be taken into due consideration at the design stage of the shoe. It can in fact be readily understood that such condition is extremely variable, not only among the individual wearers themselves, but also during a same and single day, since it is largely known that certain parts of the foot are subject to swelling. Moreover, the rigidity of the materials tends to increase under a variety of environmental conditions in which the footwear is used, such as the low temperature prevailing on ski slopes, and this may occur to such an extent as to cause the shell

to become substantially non-deformable, i.e. extremely rigid.

It therefore is a major aim of the present invention to provide an inner lining shoe that is capable of keeping adherent to the external structure of a boot or other footwear of the above-indicated kind under any environmental condition in which the boot itself may also be used.

It is another aim of the present invention to provide an inner lining shoe that is capable of constantly ensuring a level of comfort as required and necessary in order to enable a wearer to really enjoy practicing the related sport.

According to the present invention, these and further aims are reached by an inner lining shoe of the above-indicated type that incorporates the features as recited in Claim 1.

A non-limiting example of embodiment of the present invention shall now be described in greater detail with reference to the accompanying drawing, in which:

- Figure 1 is a side view of an inner lining shoe according to the present invention, intended for use in connection with a front entry ski boot;
- Figure 2 is a rear elevation view of the inner lining shoe shown in Figure 1;
- Figure 3 is a three-dimensional view from the rear of the same inner lining shoe.

Schematically shown in dashed lines in Figure 1, where it is generally indicated at P, there is also the foot of a user wearing the inner lining shoe, the latter being in turn generally indicated at 10. The various parts of the foot are themselves indicated by reference letters, namely: the toes are indicated at D, the bony protuberance above the metatarsus is indicated at M, the plantar arch is indicated at S, the instep is indicated at C, a malleolus is indicated at K, the heel is indicated at T, and the Achilles tendon is indicated at A.

The inner lining shoe 10 for ski boots illustrated in the Figures is of the kind having a front aperture and, in a manner that is largely known as such in the art, comprises a vamp portion 12, onto which there is sewn a flexible sole 14, and a leg-piece 16 extending upwards beyond the instep C of the foot P. The front aperture (not shown) provided for the foot P to be able to slip into the inner lining shoe 10 is guarded by a tongue 18, which extends starting from a zone 13 lying above the toes D, where the tongue 18 is practically hinged, and reaching up to the free upper edge 17 of the leg-piece 16.

Again in a manner that is largely known as such in the art, the structures of the vamp portion 12 and the tongue 18 comprise an inner liner of soft and transpiring textile material (eg. fine velvet backed by a sheet of foamed polyurethane) and an outer liner made of impermeable, non-extensible textile material (eg. polyethylene-backed polyester fibres), as well as a soft padding (eg. polyurethane or polyethylene) that is enclosed between said inner and

outer liners. It will be appreciated that the non-extensibility of the outer liner is to be understood in the sense relating to the stresses and loads which the inner lining shoe 10 is generally subject to in practical use, and not in absolute terms.

In view of ensuring an improved, more effective resistance against possible damages deriving from the coupling between the ski boot (not shown) and the inner lining shoe 10, owing to said inner lining shoe and said boot being in conjunction with each other, the structure of the leg-piece 16 comprises an outer cladding layer (eg. rigid polyethylene) i.e. a material that is resistant to abrasion and/or tearing. Abrasion and tearing effects might in fact be induced by a tight-fitting contact between the outer surface of the inner lining shoe 10 and the inside surface of the outside rigid shell of the boot.

According to a main feature of the present invention, the structure of the inner lining shoe 10 provides for an insert 20 to be used in at least one aperture 30 of the vamp 12, said insert being made of a softer material and having a greater elasticity than the parts of said vamp portion 12 other than the one where said aperture is provided. The result is that air pockets are thereby eliminated between said inner lining shoe 10 and said rigid shell being part of the external structure of the sports footwear.

In a particularly preferred embodiment of the present invention, the apertures 30 of the vamp portion 12 correspond to those parts of the wearer's foot that undergo the heaviest stresses when practicing sport and, as a result, are most of all subject to swelling, starting from the Achilles tendon A, and the insert 20 is made of a flexible synthetic material with a slow-recovery shape memory.

As used here, the term "slow-recovery shape memory material" shall be understood as meaning a material characterized in that, when pressed with a heavy, rigid body (eg. a steel ball), it only slowly and gradually springs back into the original shape thereof, sometimes with a slight reduction in thickness due to permanent set, upon removal of said rigid body. Examples of materials of this kind are cited in a number of patent publications, such as US-A-4 346 205, US-A-5 590 430 and EP-A-962 171. Further examples are following two materials indicated in the Table below, both of them available from the firm SPAC SpA (Italy):

| Trade name                | Composition | Density g/m <sup>3</sup><br>(ref. UNI EN ISO<br>2286-2) | % thickness loss<br>following pressing<br>(ref. UNI EN ISO<br>1856) |
|---------------------------|-------------|---------------------------------------------------------|---------------------------------------------------------------------|
| <i>Xeniumcolle 165/99</i> | PVC 100%    | 250 ± 10                                                | 2                                                                   |

|              |          |          |   |
|--------------|----------|----------|---|
| Colle 142/87 | PVC 100% | 105 ± 10 | 6 |
|--------------|----------|----------|---|

In the embodiment illustrated in the accompanying Figures, the above-cited insert, which is generally indicated at 20, is provided on its outer surface with a plurality of essentially horizontal or slightly downward curving corrugations 21, and is comprised of a central portion 22, which extends along the Achilles tendon A, and two offshoots 24 and 26. The offshoots 24 and 26 start from the lower end of the central portion 22 to then extend downwards, while becoming gradually narrower, on both sides of the foot P below the malleoli K and above the heel T.

Therefore, the insert 20 is essentially in the shape of a reverse Y, whose base starts off at the lower edge 19 of the leg-piece 16 or just slightly above said lower edge 19. In this embodiment, the application of the insert 20 calls for an aperture 30 to be provided in the vamp 12, in which said aperture is in the same shape as the insert 20, and the insert 20 itself to be attached to the inside surface of the vamp 12 by means of a sewing seam 28 extending all along the entire periphery of the aperture 30.

Tests carried out by the Applicant have largely demonstrated the full suitability and effectiveness of the insert 20 in enabling the afore cited aims to be advantageously reached, thanks to the elimination of the air pockets that tend to form between the inner lining shoe and the external rigid shell in today's ski boots. The level of comfort required to enable the sport practice to be continuously enjoyed by the wearer, even when the foot is fatigued (i.e. swollen) and/or is not in an anatomically ideal shape, is maintained since the insert is capable of effectively opposing the force exerted onto the foot by the external shell of the boot.

In other embodiments falling within the scope of the present invention as defined by the appended claims, further to the afore described insert 20 there are provided other suitably shaped inserts arranged in correspondence to the bony protuberance M above the metatarsus N and/or the instep C of the foot P.

It will be readily appreciated that further embodiments, and variants thereof, may be subsequently developed by those skilled in the art without departing from the scope of the present invention as defined by the following claims.

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CLAIMS

1. Inner lining shoe (10) of the front entry type intended for use in conjunction with ski boots and other articles of footwear, generally associated to sports gear, of the type provided with an external structure comprising a shell and a sometimes articulated leg-piece, both made of substantially rigid plastic materials, said inner lining shoe comprising a vamp portion (12), onto which there is attached a sole (14), and being **characterized in that** at least on the part of the vamp portion (12) corresponding to the Achilles tendon (A) of the wearer's foot (P) there is provided an aperture (30) plugged with at least one corresponding insert (20) made of a material that is softer and has a greater elasticity than the material of the parts of said vamp portion (12) other than the one where said aperture (30) is provided, with the result that air pockets between said inner lining shoe (10) and said shell in the external structure of the boot are thereby eliminated.

2. Inner lining shoe (10) according to claim 1, characterized in that said at least one insert (20) is attached to said vamp portion (12) along the entire periphery of said aperture (30).

3. Inner lining shoe (10) according to claim 2, characterized in that said at least one insert (20) is attached to the inside surface of said vamp portion (12) by means of a sewing seam (28) extending along the entire periphery of said aperture (30).

4. Inner lining shoe (10) according to claim 4, characterized in that said insert (20) includes a central portion (22), which extends vertically along the Achilles tendon (A) of the wearer's foot (P), and a couple of offshoots (24, 26) that start off the lower end of the central portion (22) to then extend downwards, while becoming gradually narrower, on both sides of the foot (P) below the malleoli (K) and above the heel (T).

5. Inner lining shoe (10) according to claim 5, characterized in that said insert (20) is provided on its outer surface with a plurality of essentially horizontal or slightly downward curving corrugations (21).

6. Inner lining shoe (10) according to claim 4, characterized in that, further to said insert (20) on the part of the vamp portion (12) corresponding to the Achilles tendon (A) of the wearer's foot (P), it comprises additional suitably shaped inserts arranged in correspondence to the bony protuberance (M) above the metatarsus (N) and/or the instep (C) of the foot (P).

7. Inner lining shoe (10) according to claim 1, characterized in that said at least an insert (20) is made of a flexible slow-recovery shape-memory synthetic material.

8. Inner lining shoe (10) according to claim 7, characterized in that said flexible slow-

recovery shape-memory synthetic material is a PVC having a density ranging from approx. 80 to approx. 300 g/m<sup>3</sup>, preferably from 110 to 250 g/m<sup>3</sup>, and a thickness reduction following compression ranging from approx. 1% to approx. 10%, preferably from 2% to 6%, whereas the parts of said vamp portion (12) other than the one where there is provided said aperture

5 (30) are made of polyethylene backed polyester fibres.

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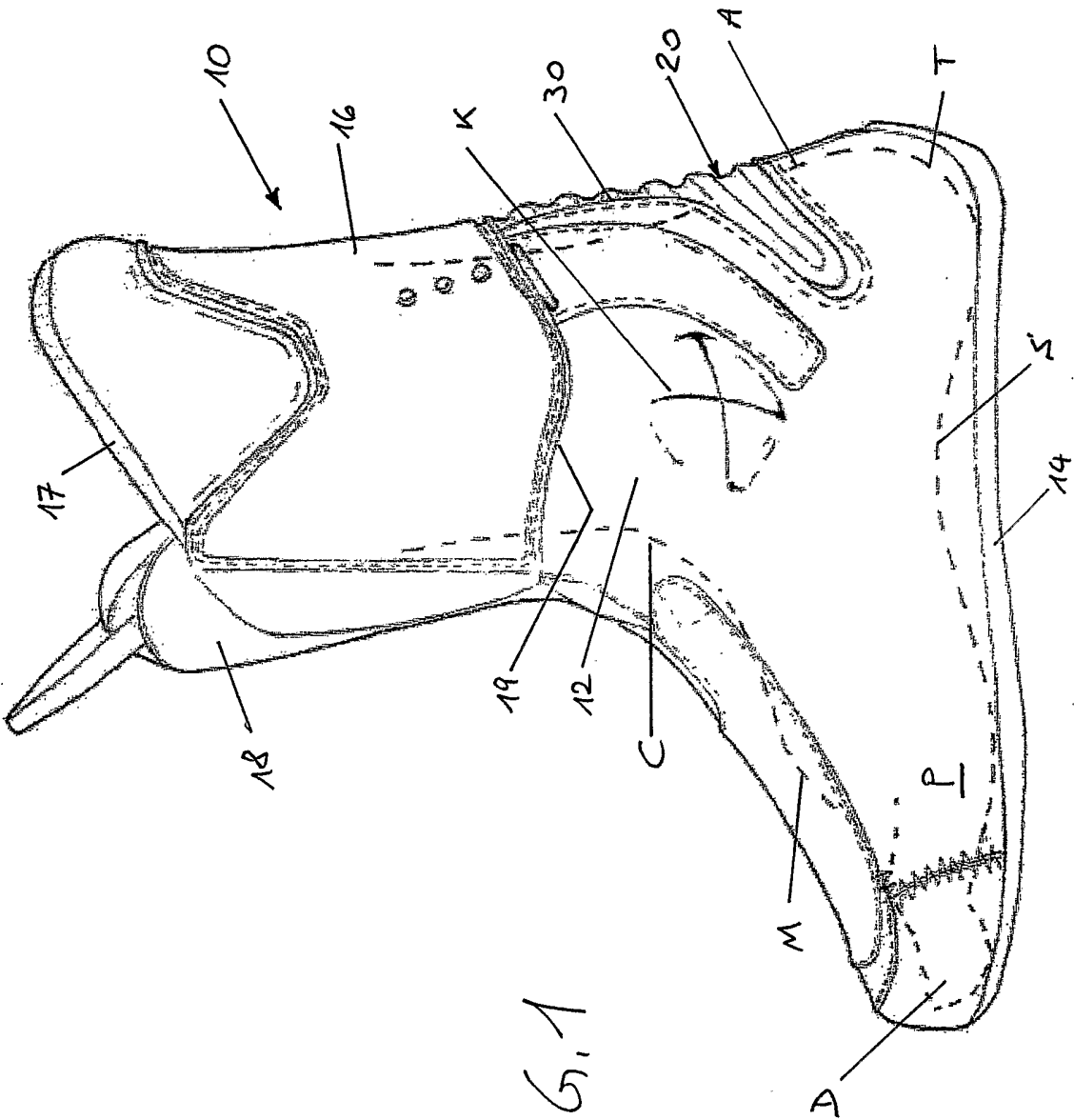
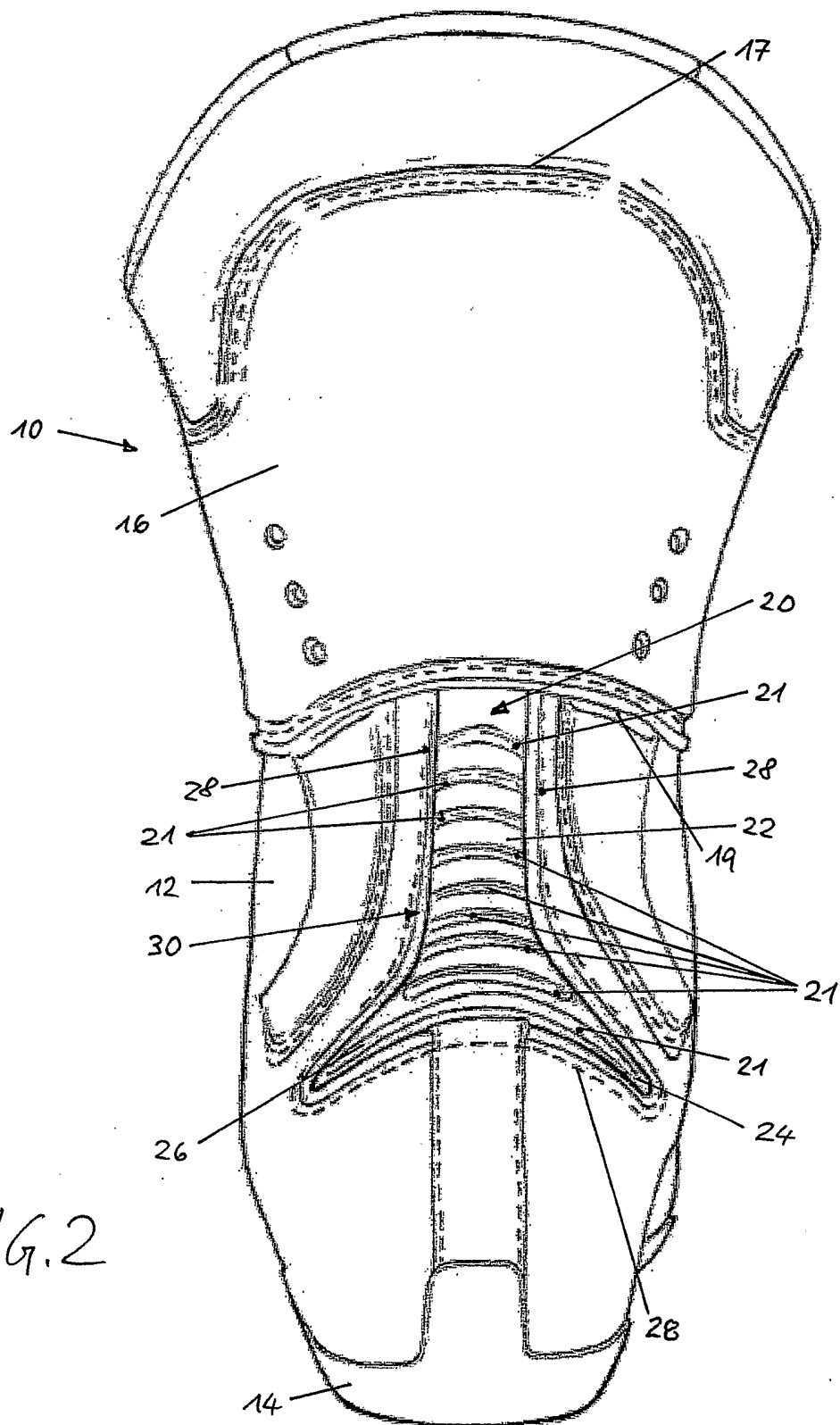
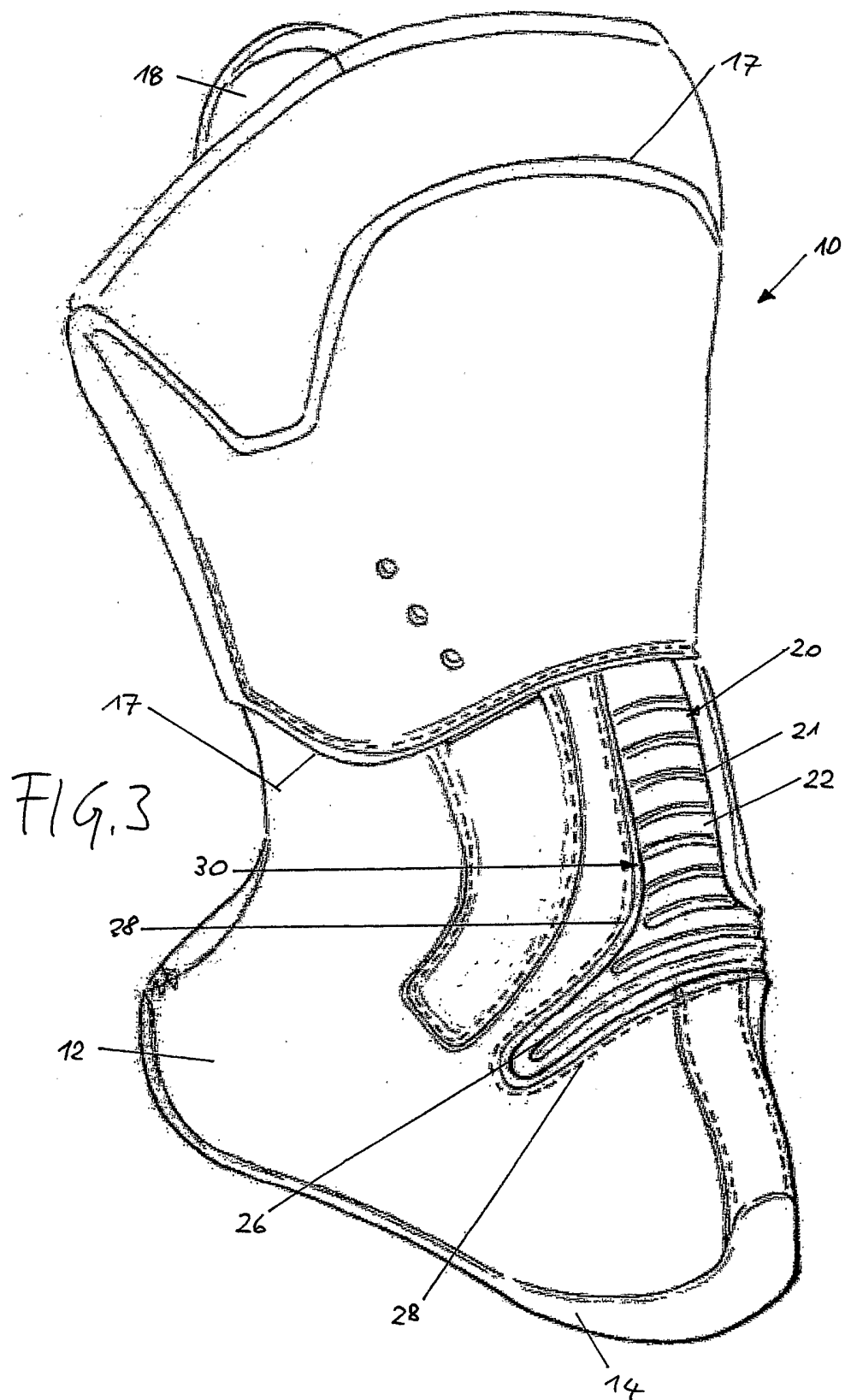


FIG. 1





# INTERNATIONAL SEARCH REPORT

International Application No

PCT/IT2005/000031

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 A43B5/04

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)

IPC 7 A43B

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

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

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                                                                 | Relevant to claim No. |
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Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

\* Special categories of cited documents:

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- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
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Date of the actual completion of the international search

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Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/IT2005/000031

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
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