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Declaration under Rule 4.17:
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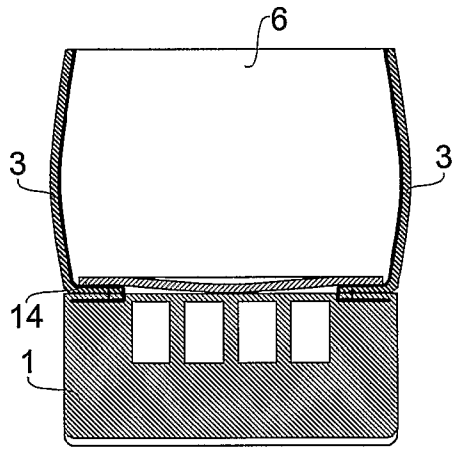
(54) Title: WATERPROOF TURNED FOOTWEAR, AS WELL AS PROCESS AND LAST FOR ITS MANUFACTURE



(57) Abstract: Turned footwear comprising a sole (1) which includes at least one perimetric wall (2) arranged around its upper surface (1a), as well as an upper (3) having the lower edge (3a) joined to this perimetric wall (2), which is bent inwards together with this lower edge (3a) and is joined to the upper surface (1a) of the sole (1), wherein at least one waterproofing membrane (6) is applied to the inner surface of the upper (3) and has the lower edge (Sa) which is comprised between the perimetric wall (2) bent inwards and the upper surface (Ia) of the sole (1). The present invention also relates to a process and a last for manufacturing said turned footwear.

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WATERPROOF FOOTWEAR, AS WELL AS PROCESS AND LAST FOR ITS MANUFACTURE

The present invention relates to waterproof footwear, and in particular to footwear provided with a semipermeable or breathable waterproof upper, i.e. impermeable to water and permeable to water vapor. The present invention also relates to a process and a last for manufacturing said footwear.

Known footwear of the firm Aerosoles® is manufactured with a particular technique, in which the upper is turned inside out and its lower edge is sewn to a perimetric wall arranged around the upper surface of an elastomeric sole, so that this perimetric wall can be bent inwards and joined to the upper surface of the sole before the upper is turned inside out again.

However, waterproof footwear cannot be manufactured with this technique, since uppers waterproofed with chemical treatments and/or lined with waterproofing membranes would also be sewn to the sole along their lower edge, so that water would leak through the holes of these seams.

It is therefore an object of the present invention to provide waterproof footwear which can be manufactured with said technique. Said object is achieved with a footwear, a process and a last, the main features of which are disclosed in claims 1, 10 and 24, while other features are disclosed in the remaining claims.

Thanks to the process according to the present invention, footwear manufactured with the Aerosoles® technique can be waterproofed in a simple and quick manner. As a matter of fact, with this process one or more waterproofing membranes can be applied to the inner surface of the upper when the latter is turned inside out, thereby avoiding in any case water penetrations along the seam between upper and sole.

According to a particular aspect of the invention, the lower edge of the waterproofing membrane is joined to the upper surface of the sole and/or to its perimetric wall by means of one layer of glue, preferably polyurethane glue, so as to reduce the manufacture times and costs.

The process according to the present invention can further be optimized thanks to a particular last which can be arranged into the upper turned inside out during the

pressing of the perimetric wall onto the sole and/or of the waterproofing membrane to the upper.

Finally, the pressing step of the process according to the present invention can be carried out with a press with deformable plates as disclosed in WO 02/11571 or WO 2004/112525, so as to further reduce the manufacture times. During this step the footwear is preferably turned upside down, so as to improve the application of the waterproofing membrane to the upper.

Further advantages and features of the footwear, the process and the last according to the present invention will become clear to those skilled in the art from the following detailed and non-limiting description of an embodiment thereof with reference to the attached drawings, wherein:

- figure 1 shows a partial view in a longitudinal section of the footwear during a first step of the manufacture process;
- figure 2 shows a cross-sectioned view along plane II-II of figure 1; and
- figures 3 to 8 show cross or longitudinal section views of the footwear of figure 1 during subsequent steps of the manufacture process.

Referring to figures 1 and 2, it is seen that the footwear according to the present invention comprises in a known way a sole 1 made of an elastomeric material, for example rubber, PVC or polyurethane, which includes at least one perimetric wall 2 arranged around its upper surface 1a. An upper 3 is arranged inside out outside sole 1, so that the outer surface of upper 3 is turned toward sole 1, while the lower edge 3a of upper 3 is temporarily turned upwards and is arranged adjacent to the outer surface of the perimetric wall 2. Upper 3, being turned inside out, may thus temporarily protrude under sole 1. A seam 4 joins the perimetric wall 2 of sole 1 with the lower edge 3a of upper 3. Sole 1 can be lightened by a plurality of alveoli 5.

Figure 3 shows a second step of the process according to the present invention, wherein at least one waterproofing membrane 6 is arranged around upper 3, so as to cover at least partially the inner surface of upper 3 turned outwards. The lower edge 6a of the waterproofing membrane 6 is temporarily turned upwards. The waterproofing membrane 6 is preferably semipermeable or breathable, i.e. impermeable to water and permeable to water vapor, in particular with a permeability to water vapor greater than

400 g/m^2 * 24h. The waterproofing membrane 6 is further preferably elastic with an elongation degree greater than 50% and is made of a polymeric material, for example PTFE, polyurethane or polyester. The waterproofing membrane 6 can also be coupled with an inner lining, which is temporarily turned to the side opposite to upper 3, so that the membrane is comprised between upper 3 and this lining. A first layer of glue 7, in particular polyurethane glue, is applied onto the inner surface of the perimetric wall 2 and/or onto the upper surface 1a of sole 1 along the perimetric wall 2.

Figure 4 shows a third step of the process according to the present invention, wherein the lower edge 6a, temporarily turned upwards, of the waterproofing membrane 6 is bent in the direction of the arrows around the lower edge 3a of upper 3 and around the perimetric wall 2 of sole 1, so as to cover at least partially the inner surface of the perimetric wall 2 and to be joined by means of the first layer of glue 7 to this inner surface and/or to the upper surface 1a of sole 1 along the perimetric wall 2. A second layer of glue 8, in particular polyurethane glue, is applied onto the inner surface of the lower edge 6a of the waterproofing membrane 6 and/or to the upper surface 1a of sole 1 along the perimetric wall 2.

Figures 5 and 6 show a fourth step of the process according to the present invention, wherein a last 9 having an upper surface complementary with the lower surface of sole 1 and lateral surfaces complementary with the outer surface of upper 3 temporarily turned inwards is arranged in contact with sole 1 within upper 3, after which a press 10 bends inwards, presses onto the upper surface 1a of sole 1 and bonds on this upper surface by means of the second layer of glue 8 the perimetric wall 2 of sole 1 joined to the lower edge 3a of upper 3. The lower edge 6a of the waterproofing membrane 6 is thus comprised between the perimetric wall 2 bent inwards and the upper surface 1a of sole 1.

Figure 7 shows a fifth step of the process according to the present invention, wherein sole 1 joined to upper 3 and to the waterproofing membrane 6 is temporarily turned upside down, so that last 9 is arranged on sole 1. This whole is then arranged onto a support 11 for being pressed in a press with deformable plates 12 and 13, so as to press upper 3 against last 9 and/or sole 1. During this pressing step, the waterproofing membrane 6 adheres to the inner surface of upper 3 by means of a discontinuous or

continuous layer of adhesive arranged between membrane 6 and upper 3. Said adhesive can be applied in a dot matrix onto the outer surface of the waterproofing membrane 6 and/or comprise polyurethane glue, so that upper 3 remains breathable if the waterproofing membrane 6 is semipermeable.

Figure 8 shows a sixth step of the process according to the present invention, wherein last 9 is removed and upper 3 is turned inside out, so that its outer surface is turned outwards and its inner surface, provided with the waterproofing membrane 6, is turned inwards. Also the inner lining, if any, of the waterproofing membrane 6 is thus turned inwards. An insole 14 can be applied on sole 1 and the bent perimetric wall 2.

Possible variations and/or additions may be made by those skilled in the art to the hereinabove described and illustrated embodiment of the invention while remaining within the scope of the following claims.

CLAIMS

1. Footwear comprising a sole (1) which includes at least one perimetric wall (2) arranged around its upper surface (1a), as well as an upper (3) having the lower edge (3a) joined to this perimetric wall (2), which is bent inwards together with this lower edge (3a) and is joined to the upper surface (1a) of the sole (1), characterized in that at least one waterproofing membrane (6) is applied to the inner surface of the upper (3) and has the lower edge (6a) which is comprised between the perimetric wall (2) bent inwards and the upper surface (1a) of the sole (1).

2. Footwear according to the previous claim, characterized in that a first layer of glue (7) is applied to the inner surface of the perimetric wall (2) and/or to the upper surface (1a) of the sole (1) along the perimetric wall (2) for bonding the lower edge (6a) of the waterproofing membrane (6) to the inner surface of the perimetric wall (2) and/or to the upper surface (1a) of the sole (1) along the perimetric wall (2).

3. Footwear according to one of the previous claims, characterized in that a second layer of glue (8) is applied to the inner surface of the lower edge (6a) of the waterproofing membrane (6) and/or to the upper surface (1a) of the sole (1) along the perimetric wall (2) for bonding the perimetric wall (2) onto the upper surface (1a) of the sole (1).

4. Footwear according to one of the previous claims, characterized in that the waterproofing membrane (6) adheres to the inner surface of the upper (3) by means of a layer of adhesive arranged between the membrane (6) and the upper (3).

5. Footwear according to the previous claim, characterized in that said adhesive is applied in a dot matrix on the outer surface of the waterproofing membrane (6).

6. Footwear according to one of claims 2 to 5, characterized in that said glue (7, 8) or adhesive comprises polyurethane glue.

7. Footwear according to one of the previous claims, characterized in that the waterproofing membrane (6) is semipermeable or breathable, in particular with a permeability to water vapor greater than 400 g/m^2 * 24h.

8. Footwear according to one of the previous claims, characterized in that

the waterproofing membrane (6) is elastic with an elongation degree greater than 50% and is made of a polymeric material.

9. Footwear according to one of the previous claims, characterized in that the lower edge (3a) of the upper (3) is joined to the perimetric wall (2) of the sole (1) by means of at least one seam (4).

10. Process for manufacturing footwear, which comprises the following operating steps:

- arranging an upper (3) turned inside out outside a sole (1) which includes at least one perimetric wall (2) arranged around its upper surface (1a), so that the outer surface of the upper (3) is turned toward the sole (1), while the lower edge (3a) of the upper (3) is temporarily turned upwards and is arranged adjacent to the perimetric wall (2);
- joining the lower edge (3a) of the upper (3) to the perimetric wall (2);
- bending inwards the perimetric wall (2);
- joining the perimetric wall (2) to the upper surface (1a) of the sole (1);
- turning the upper (3) inside out, so that its outer surface is turned outwards;

characterized by the following operating step:

- arranging at least one waterproofing membrane (6) around the upper (3) turned inside out before bending the perimetric wall (2) inwards, so that the waterproofing membrane (6) covers at least partially the inner surface of the upper (3) turned outwards and that the lower edge (6a) of the waterproofing membrane (6) temporarily turned upwards protrudes inwards over the lower edge (3a) of the upper (3) and covers at least partially the inner surface of the perimetric wall (2) of the sole (1).

11. Process according to the previous claim, characterized in that the lower edge (6a) of the waterproofing membrane (6) is comprised between the upper surface (1a) of the sole (1) and the perimetric wall (2) when the latter is bent inwards.

12. Process according to claim 10 or 11, characterized in that a first layer of glue (7) is applied to the inner surface of the perimetric wall (2) and/or onto the upper surface (1a) of the sole (1) along the perimetric wall (2) for bonding the lower edge (6a) of the waterproofing membrane (6) to the inner surface of the perimetric wall (2) and/or

to the upper surface (1a) of the sole (1) along the perimetric wall (2).

13. Process according to one of claims 10 to 12, characterized in that a second layer of glue (8) is applied to the inner surface of the lower edge (6a) of the waterproofing membrane (6) and/or onto the upper surface (1a) of the sole (1) along the perimetric wall (2) for bonding the perimetric wall (2) onto the upper surface (1a) of the sole (1).

14. Process according to one of claims 10 to 13, characterized in that the waterproofing membrane (6) adheres to the inner surface of the upper (3) by means of a layer of adhesive arranged between the membrane (6) and the upper (3).

15. Process according to the previous claim, characterized in that said adhesive is applied in a dot matrix to the outer surface of the waterproofing membrane (6).

16. Process according to one of claims 12 to 15, characterized in that said glue (7, 8) or adhesive comprises polyurethane glue.

17. Process according to one of claims 10 to 16, characterized in that the sole (1) joined to the upper (3) and to the waterproofing membrane (6) is pressed in a press with deformable plates (12, 13) for joining the waterproofing membrane (6) to the upper (3).

18. Process according to the previous claim, characterized in that during said pressing step a last (9) having an upper surface complementary with the lower surface of the sole (1) and lateral surfaces complementary with the outer surface of the upper (3) temporarily turned inwards is arranged in contact with the sole (1) within the upper (3).

19. Process according to the previous claim, characterized in that during said pressing step the last (9) is arranged above the sole (1).

20. Process according to one of previous claims 10 to 19, characterized in that a last (9) having an upper surface complementary with the lower surface of the sole (1) and lateral surfaces complementary with the outer surface of the upper (3) temporarily turned inwards is arranged in contact with the sole (1) within the upper (3) when the perimetric wall (2) of the sole (1) is bent inwards and joined to the upper surface (1a) of the sole (1).

21. Process according to one of claims 10 to 20, characterized in that the waterproofing membrane (6) is semipermeable or breathable, in particular with a permeability to water vapor greater than 400 g/m^2 * 24h.

22. Process according to one of claims 10 to 21, characterized in that the waterproofing membrane (6) is elastic with an elongation degree greater than 50% and is made of a polymeric material.

23. Process according to one of claims 10 to 22, characterized in that the lower edge (3a) of the upper (3) is joined to the perimetric wall (2) of the sole (1) by means of at least one seam (4).

24. Last (9) for manufacturing footwear with the process according to one of claims 10 to 23, characterized in that it comprises an upper surface complementary with the lower surface of the sole (1) of a footwear to be manufactured and lateral surfaces complementary with the outer surface of the upper (3) of this footwear, so that the last (9) can be arranged in contact with the sole (1) within the upper (3) turned inside out.

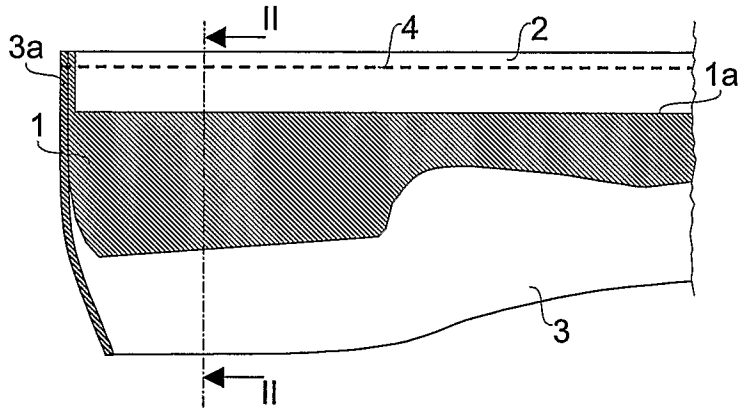

Fig.1

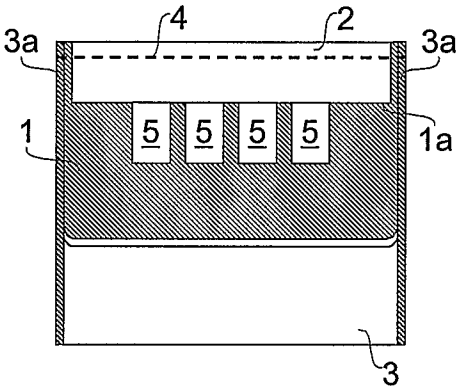

Fig.2

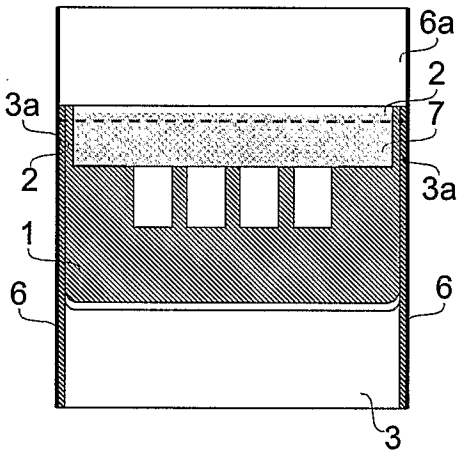

Fig.3

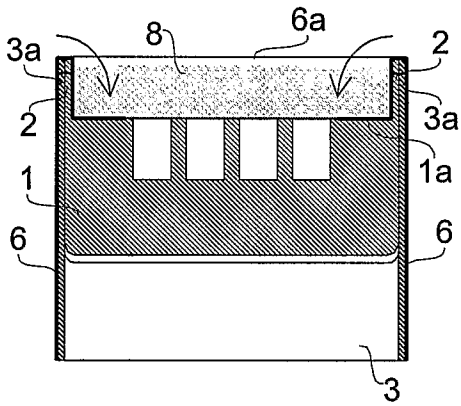

Fig.4

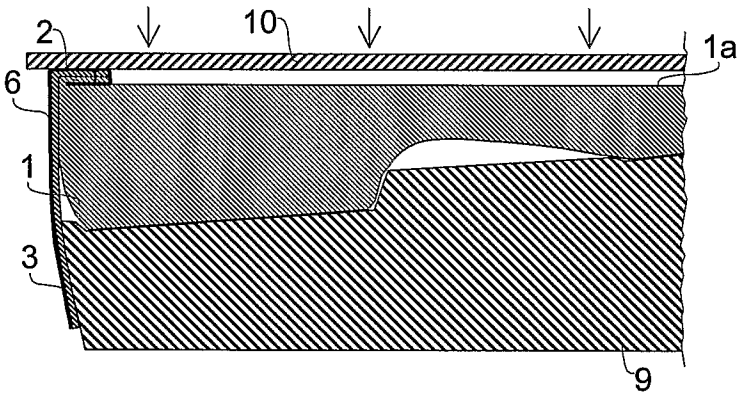

Fig.5

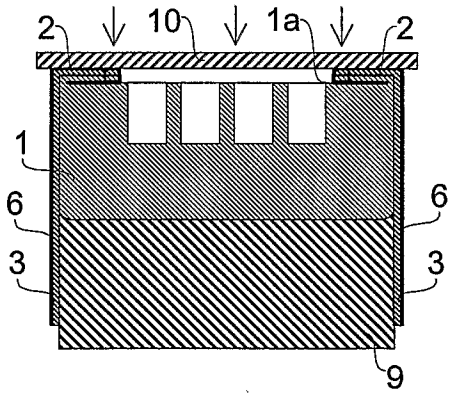

Fig.6

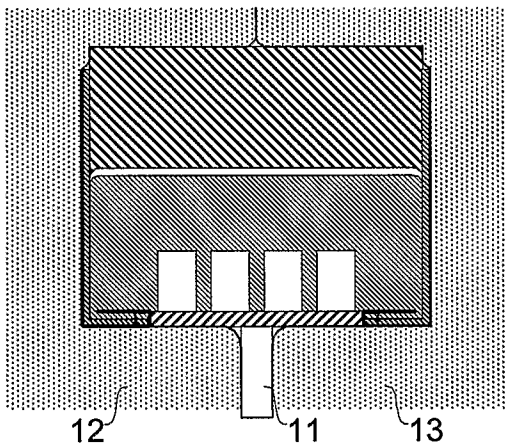

Fig. 7

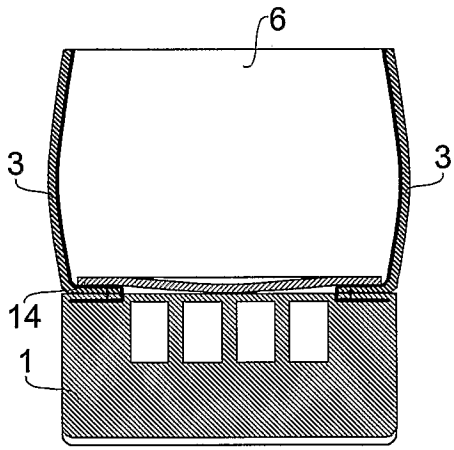

Fig. 8

INTERNATIONAL SEARCH REPORT

International application No
PCT/PT2006/000011

A. CLASSIFICATION OF SUBJECT MATTER
INV. A43B9/08 A43B9/12 A43B7/12 A43D3/00

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)
A43B A43D

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, 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 2004/261201 A1 (ISSLER JAMES E) 30 December 2004 (2004-12-30) figures 4,8,9	1,10
A	FR 2 581 517 A (MARTEL RENE) 14 November 1986 (1986-11-14) figures 3,4	1,10
A	DE 299 22 076 U1 (SPORTSCHUHFABRIK HANS WAGNER GMBH & CO. KG) 6 April 2000 (2000-04-06) figure 5	1,10
A	US 2003/115679 A1 (MORLACCHI LUCA ET AL) 26 June 2003 (2003-06-26) claim 1	10

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[X] Further documents are listed in the continuation of Box C.

[X] 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

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"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.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 July 2006	22/06/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016	Vesin, Stéphane

INTERNATIONAL SEARCH REPORT

International application No
PCT/PT2006/000011

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 2002/053148 A1 (HAIMERL FRANZ) 9 May 2002 (2002-05-09) figures	1,10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/PT2006/000011

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1- 23

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-23

Turned footwear with waterproof membrane and method of manufacturing such footwear

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2. claim: 24

Last for manufacturing turned footwear

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/PT2006/000011

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