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(54) **FLEXIBLE FOOTWEAR**

(57) The present invention relates to flexible footwear that comprises flexing means, either in the sole or in the upper, or in both, and said means in turn comprise a groove placed transversely and recovering means placed transversely to said groove such that, when the

footwear flexes along the groove, the action of said recovery means cause the footwear to recover, promoting recovery of the initial form of the footwear upon completion of each step, and thereby enhancing walking comfort.

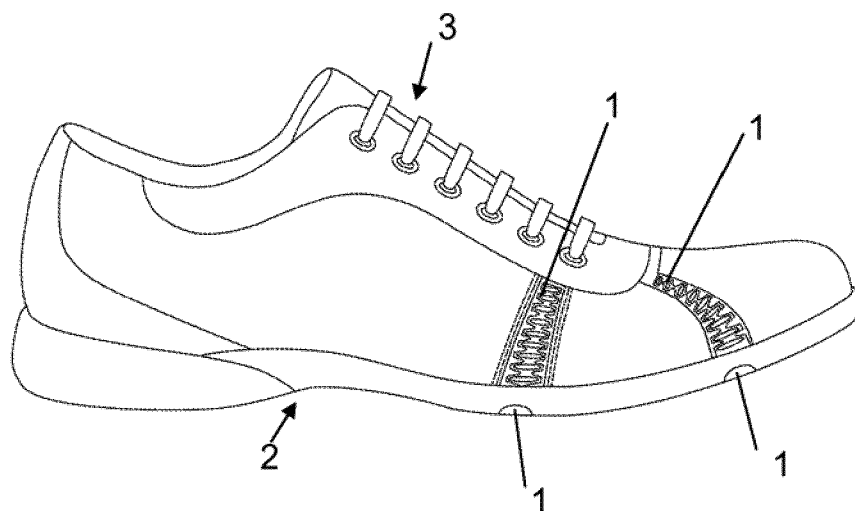


FIG.7

Description

OBJECT OF THE INVENTION

[0001] The present invention belongs to the field of footwear that flexes when walking.

[0002] This invention is a flexible footwear that comprises flexion means, either in the sole, in the upper or in both, said means in turn comprising a groove placed transversely and recovery means placed transversely to said groove, such that when the footwear flexes along the groove the action of said recovery means causes the footwear to recover, promoting recovery of the initial form of the footwear upon completion of each step, thereby enhancing walking comfort.

BACKGROUND OF THE INVENTION

[0003] In line with the current trend to improve the ergonomics of footwear so that it is as well adapted as possible to walking movements, the footwear is designed and built to try to adapt it as much as possible to the natural movement of the foot.

[0004] To this end, one of the first characteristics that must be fulfilled is flexibility, which is achieved initially by materials that, in general, allow the footwear to flex to a greater or lesser extent in order to adapt to the flexion of the foot while walking.

[0005] As this flexibility of the materials is not enough, configurations are added to certain areas of the footwear to promote the said flexion.

[0006] The incorporation of grooves in the sole of the footwear in order to promote its flexion is known, as described in PCT patent with publication document W02008115743.

[0007] Another way to make the footwear flexible is to incorporate in its upper a bellows-like configuration, as in European patent with publication number EP109385.

[0008] However, these solutions are insufficient for adapting to the movement naturally executed by the foot while walking.

[0009] In addition to said flexion, the foot must recover its form prior to the flexion with the original disposition, repeating step after step with the least possible effort and maximum comfort.

[0010] The state of the art does not solve the adaptation of the flexion and recovery needed for an ideal adaptation to the movement of the foot.

DESCRIPTION OF THE INVENTION

[0011] The present invention is established and characterised in the independent claims, while the dependent claims describe additional characteristics thereof.

[0012] The present invention relates to a flexible footwear that comprises flexion means which in turn comprise at least one groove placed transversely in the anterior part of the footwear and recovery means placed

transversely to said groove, so that when the footwear flexes about the groove it is recovered by the action of said recovery means.

[0013] The disclosed invention solves the drawbacks of the state of the art, as it proposes in the same footwear a combination of flexion and recovery, with the advantage of being adapted as much as possible to the natural movement of the foot, this is, optimising the ergonomics, resulting in further advantages such as comfort, reduced fatigue, etc.

BRIEF DESCRIPTION OF THE FIGURES

[0014] The present specification is accompanied by a set of figures that illustrate and in no way limit the preferred embodiment of the invention.

Figure 1 shows a perspective detail of the flexion means that form an integral part of the footwear.

Figure 2 shows a plan detail view of the recovery means perpendicular to the tangent to the groove.

Figure 3 shows a plan detail view of the recovery means forming a broken line.

Figure 4 shows a plan detail view of the recovery means forming crosses by pairs.

Figure 5 shows a plan view of the sole with concave and convex flexion means.

Figure 6 shows a plan view of the sole with flexion means that form part of it separately.

Figure 7 shows an elevation view of a shoe with flexion means in the sole and the upper.

Figure 8 shows a plan view of the sole with flexion means having straight grooves.

Figure 9 shows a sole with flexion means duplicated in the anterior and mid areas.

DETAILED DESCRIPTION OF THE INVENTION

[0015] The present embodiment of the invention describes a shoe with flexion means (1) that include a groove (1.1) placed transversely in the anterior part of said shoe and recovery means (1.2) placed transversely to said groove (1.1), such that when the shoe flexes along the groove (1.1) it recovers by the action of said recovery means (1.2).

[0016] The anterior part of the shoe refers to the part of the shoe that flexes when walking, that is, the part between the toe and the start of the heel.

[0017] The groove (1.1) is a notch or channel made transverse to the shoe, that is, the longitudinal axis of

said groove (1.1) is essentially transverse to the longitudinal axis of the shoe, by which is meant an approximately right angle between these longitudinal axes.

[0018] The same terms are used to describe the transverse arrangement of the recovery means (1.2) with respect to the groove (1.1), understanding as a transverse situation the one formed between the two longitudinal axes and approaching a right angle.

[0019] Specifically, the recovery means (1.2) are longitudinal configurations whose ends extend beyond the width of the groove (1.1), as shown in figure 1, these ends being housed in incisions (1.3) that are local extensions of the groove (1.1) beyond its average width.

[0020] The recovery means (1.2) can be placed differently with respect to the groove (1.1) and depending on its curvature:

- perpendicular to the tangent to the groove (1.1), thereby including both the radial arrangements when the groove (1.1) is curved, as shown in figure 2, and the parallel ones when the groove (1.1) is straight, as shown in figure 8;
- forming a broken line, so that the end of one recovery means is adjacent to the end of the next recovery means, as shown in figure 3;
- forming X's by pairs, so that they cross to form an X as shown in figure 4.

[0021] The flexion means (1) are located in a specific embodiment in the sole (2) of the shoe, either forming an integral part of it or separately.

[0022] By forming an integral part is meant that they are made of the same material as the sole (2) and by known manufacturing methods, such as injection, vulcanisation, casting, compression, etc.

[0023] One example of flexion means (1) that form an integral part of the sole (2) is shown in figure 1. The mechanical operation of the recovery means (1.2) is such that when the sole (2) is flexed, the means that have been stretched recover their initial length elastically, thereby assisting in the recovery of the original form of the foot.

[0024] In the case of artisanal or "artistic" soles, such as leather soles, the flexion means (1) are placed separately, meaning that they form a separate element joined to the sole (2) by known methods such as gluing, sewing, etc.

[0025] In the sole (2), the attachment grooves (1.1) are located in the areas of the foot where the flexion takes place when walking, flexing in a direction transverse to the longitudinal axis of the foot. These areas are placed according to the result of biomechanical medical studies performed by specialised orthopaedic podiatrists.

[0026] The areas of the foot where the flexion occurs when walking are: an anterior area (4), near the toes; a mid area (5), at the end of the metatarsal. Between these areas is the tread area, which is flat and is a transition between the anterior and mid areas.

[0027] When walking the step begins by striking the

ground with the heel, following by the mid area (5) where a flexion occurs, and then the tread area from the mid area (5) to the anterior area (4), where there is another flexion, finally reaching the end of the toes.

[0028] The flexion in the flexion areas is enabled by the groove (1.1) and the elastic properties of the recovery means (1.2); these properties also mean that the elastic tension will invert the initial flexion to return the groove (1.1) to its initial position.

[0029] The materials used for the flexion means (1) are those with "memory", as they have optimum elastic properties for intensive use in footwear, both in the sole (2) and in the upper (3).

[0030] As regards the form of the grooves (1.1), maintaining the aforementioned transverse orientation, the grooves (1.1) are straight, as shown in figure 8, or have different curvatures, either both concave, both convex or a combination thereof. A specific embodiment with this combination is shown in figure 5, where the flexion means (1) of the anterior part (4) are concave with respect to the toe and the flexion means (1) of the mid part (5) are convex with respect to the toe.

[0031] The flexion means (1) can also form part of the upper (3) of the shoe, and normally are of the type that are joined separately by gluing, sewing, etc., that is, by any known means used to manufacture a footwear upper (3).

[0032] In order to achieve the object of the invention in an optimum manner, the flexion means (1) of the upper (3) and sole (2) coincide in the same transverse section of said shoe so that its flexion and recovery occurs at the same time in the flexion means (1) of the upper (3) and of the sole (2), as shown in figure 7.

[0033] In order to aid the functioning of the footwear in very large sizes or with very thick soles, the flexion means (1) may be doubled, as shown in figure 9, tripled, etc.

[0034] The present embodiment shows a shoe, a specific example of footwear, but is equally valid for other types of footwear such as boots, sandals, etc.

Claims

1. Flexible footwear **characterised in that** it comprises flexion means (1) that in turn comprise at least one groove (1.1) placed transversely in the anterior part of said footwear and recovery means (1.2) placed transversely to said groove (1.1), such that when the footwear flexes along the groove (1.1) it is recovered by the action of said recovery means (1.2).
2. Flexible footwear according to claim 1, **characterised in that** the ends of the recovery means (1.2) extend beyond the width of the groove (1.1), these being placed in incisions (1.3) of the groove (1.1).
3. Flexible footwear according to claim 1, **characterised in that** the recovery means (1.2) are placed

perpendicular to the tangent to the groove (1.1).

4. Flexible footwear according to claim 1, **characterised in that** the recovery means (1.2) are placed forming a broken line along the groove (1.1). 5
5. Flexible footwear according to claim 1, **characterised in that** the recovery means (1.2) are placed in two's, forming crosses along the groove (1.1). 10
6. Flexible footwear according to claim 1, **characterised in that** the flexion means (1.2) are placed in the sole (2) of the footwear.
7. Flexible footwear according to claim 6, **characterised in that** the flexion means are formed integrally with the sole (2) of the footwear. 15
8. Flexible footwear according to claim 6, **characterised in that** the flexion means (1.2) are formed separately to the sole (2) of the footwear and are joined to it by gluing or sewing. 20
9. Flexible footwear according to claim 1, **characterised in that** the flexion means (1.2) are placed in the upper (3) of the footwear. 25
10. Flexible footwear according to claim 1, **characterised in that** the groove (1.1) of the flexion means has a concave curvature with respect to the front end of the footwear. 30
11. Flexible footwear according to claim 1, **characterised in that** the groove (1.1) of the flexion means has a convex curvature with respect to the front end of the footwear. 35
12. Flexible footwear according to claim 1, **characterised in that** the groove (1.1) of the flexion means is straight. 40
13. Flexible footwear according to claim 1, **characterised in that** there are at least some flexion means in the anterior part (4) of the footwear and/or at least other flexion means in the mid area (5) of the footwear, coinciding with the two flexion areas of the foot. 45
14. Flexible footwear according to previous claims, **characterised in that** the flexion means of the upper (3) and of the sole (2) coincide in the same transverse section of said footwear so that the flexion and its recovery take place at the same time in the flexion means of the upper (3) and of the sole (2). 50

Amended claims under Art. 19.1 PCT

1. Flexible footwear **characterised in that** it com-

prises flexion means (1) that in turn comprise at least one groove (1.1) placed transversely in the anterior part of said footwear and recovery means (1.2) placed transversely to said groove (1.1), such that when the footwear flexes along the groove (1.1) it is recovered by the action of said recovery means (1.2), which are longitudinal configurations that in their ends extend beyond the width of the groove (1.1), these ends being placed in incisions (1.3) of the groove (1.1).

2. Flexible footwear according to claim 1, **characterised in that** the recovery means (1.2) are placed perpendicular to the tangent to the groove (1.1).

3. Flexible footwear according to claim 1, **characterised in that** the recovery means (1.2) are placed forming a broken line along the groove (1.1).

4. Flexible footwear according to claim 1, **characterised in that** the recovery means (1.2) are placed in two's, forming crosses along the groove (1.1).

5. Flexible footwear according to claim 1, **characterised in that** the flexion means (1.2) are placed in the sole (2) of the footwear.

6. Flexible footwear according to claim 5, **characterised in that** the flexion means are formed integrally with the sole (2) of the footwear.

7. Flexible footwear according to claim 5, **characterised in that** the flexion means (1.2) are formed separately to the sole (2) of the footwear and are joined to it by gluing or sewing.

8. Flexible footwear according to claim 1, **characterised in that** the flexion means (1.2) are placed in the upper (3) of the footwear.

9. Flexible footwear according to claim 1, **characterised in that** the groove (1.1) of the flexion means has a concave curvature with respect to the front end of the footwear.

10. Flexible footwear according to claim 1, **characterised in that** the groove (1.1) of the flexion means has a convex curvature with respect to the front end of the footwear.

11. Flexible footwear according to claim 1, **characterised in that** the groove (1.1) of the flexion means is straight.

12. Flexible footwear according to claim 1, **characterised in that** there are at least some flexion means in the anterior part (4) of the footwear and/or at least other flexion means in the mid area (5) of the foot-

wear, coinciding with the two flexion areas of the foot.

13. Flexible footwear according to previous claims, **characterised in that** the flexion means of the upper (3) and of the sole (2) coincide in the same transverse section of said footwear so that the flexion and its recovery take place at the same time in the flexion means of the upper (3) and of the sole (2). 5

The changes made in the claims such as were requested are: 10

- amended claim 1 by joining to the claim 2 and add the detail that the mean recovery (1.2) are longitudinal configurations such as cited in the description, page 5, line 13. 15

In addition, clarity is replaced by the pronoun "they" by replacing the name "these ends". 20

- renumber the remainder of the claims from 14 to 13 claims;
- requested claims 7 and 8 depend of the claim 6, and with the new numbering these become the claims 6 and 7 and to rely on claim 5. 25

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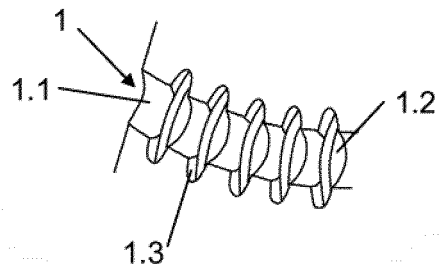


FIG.1

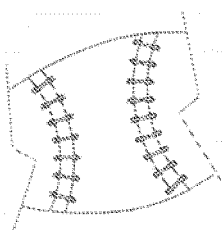


FIG.2

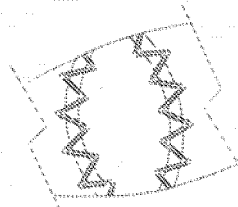


FIG.3

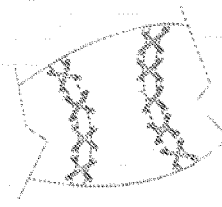


FIG.4

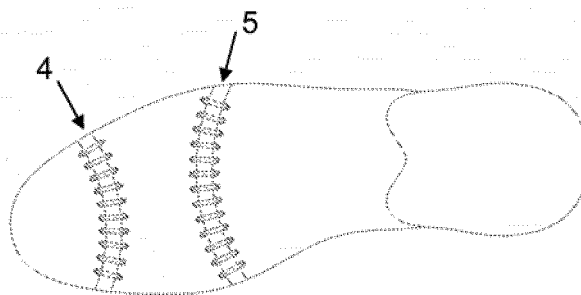


FIG.5

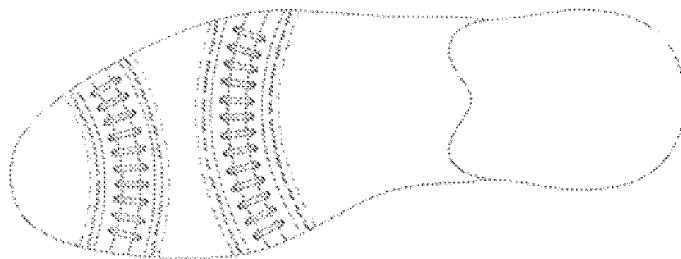


FIG. 6

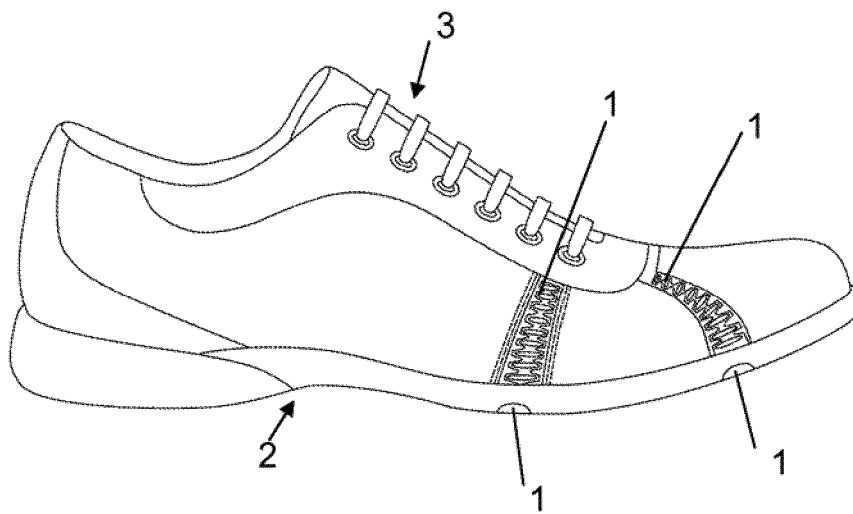


FIG. 7

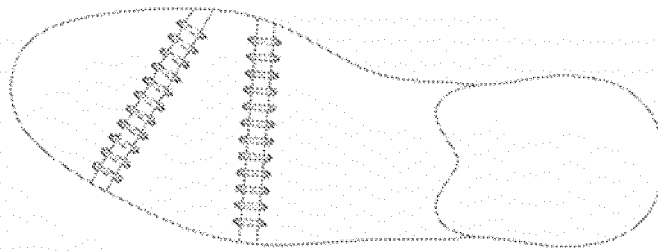


FIG. 8

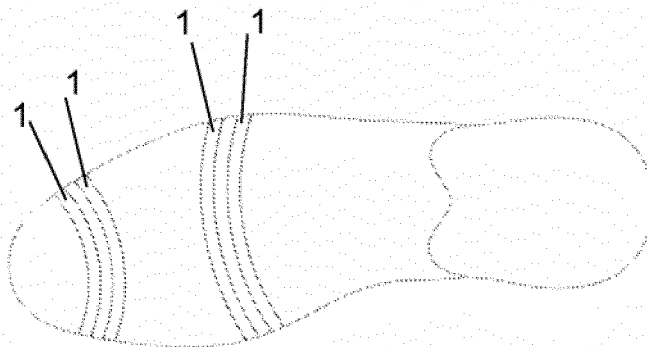


FIG. 9

INTERNATIONAL SEARCH REPORT
WO 2011/054979

International Patent Classification
PCT/ES2009/070482
PCT/ ES 2009/070482

A. CLASSIFICATION OF SUBJECT MATTER		
see extra sheet		
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+		
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 practicable, search terms used) INVENES,EPODOC, wpi		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ES 2323249 T3 (C & J CLARK INTERNAT LTD) 09.07.2009, description: page 2, lines 11-18; page 3, lines 63-66; page 4, lines 26-33; lines 60-64; figures.	1-5, 9-13
Y		6-8, 14
Y	WO 2008053350 A1 (SAMSONITE CORP ; DEL BIONDI ALBERTO ; MODOLIN ALBERTO) 08.05.2008, abstract; description:page 13, line 24 - page 14, line 17; figures 5-8.	6-8,14
X	US 2003204971 A1 (FAUVER et al.) 06.11.2003, description: paragraph [9]; paragraphs [22-24]; figures 1-2.	1-5, 9-13
A	US 5765296 A (LUDEMANN et al.) 16.06.1998, abstract; description:column 3, line 65 - column 4, line 39;column 4, line 65 - column 5, line 10; figures.	1-14
☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents: "I" 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 "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) "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 "O" document referring to an oral disclosure use, exhibition, or other means "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 documents, such combination being obvious to a person skilled in the art "P" document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family		
Date of the actual completion of the international search 11.June.2010 (11.06.2010)		Date of mailing of the international search report (21/06/2010)
Name and mailing address of the ISA/ O.E.P.M. Paseo de la Castellana, 75 28071 Madrid, España. Facsimile No. 34 91 3495304		Authorized officer E. Pértica Gómez Telephone No. +34 91 349 32 71

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WO 2011/054979

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C (continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	WO 9948397 A1 (JEFFREY S BROOKS INC ; BROOKS JEFFREY S) 30.09.1999, description: page 9, lines 1-13; figures 4,7.	1-14

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INTERNATIONAL SEARCH REPORT

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Information on patent family members

International Publication No. **PCT/ES2009/070482**
PCT/ ES 2009/070482

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INTERNATIONAL SEARCH REPORT
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International Search Report
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PCT/ ES 2009/070482

CLASSIFICATION OF SUBJECT MATTER

A47B 23/02 (2006.01)

A43B 3/24 (2006.01)

A43B 3/08 (2006.01)

REFERENCES CITED IN THE DESCRIPTION

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