



(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 153(4) EPC

(43) Date of publication:
28.03.2012 Bulletin 2012/13

(51) Int Cl.:
A43D 3/02 (2006.01)

(21) Application number: **09844969.7**

(86) International application number:
PCT/KR2009/003337

(22) Date of filing: **23.06.2009**

(87) International publication number:
WO 2010/134661 (25.11.2010 Gazette 2010/47)

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL
PT RO SE SI SK TR**

(30) Priority: **21.05.2009 KR 20090044335**

(71) Applicant: **Treksta Inc.**
Busan 618-818 (KR)

(72) Inventors:
• **PARK, Sung Won**
Busan 616-779 (KR)
• **KIM, Kyung Tae**
Busan 614-024 (KR)

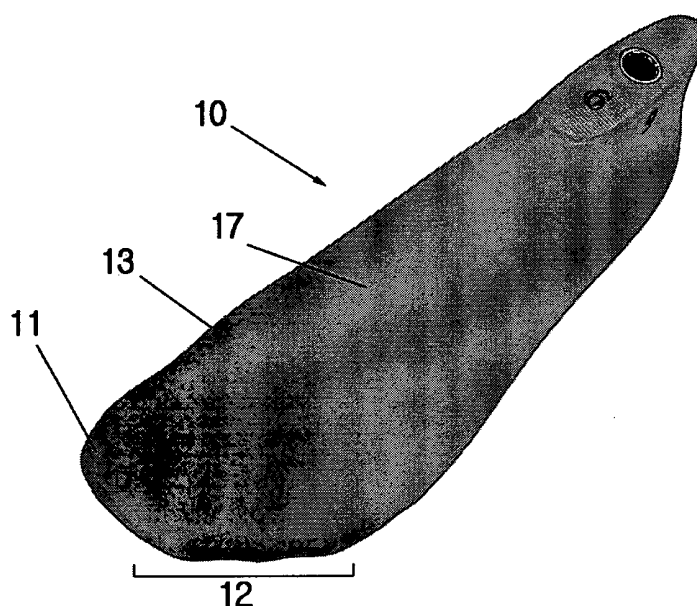
(74) Representative: **Kuhnen & Wacker**
Patent- und Rechtsanwaltsbüro
Prinz-Ludwig-Straße 40A
85354 Freising (DE)

(54) **LAST FOR MANUFACTURING SHOE**

(57) The present invention relates to the last for manufacturing a shoe, and the purpose of the present invention is to provide a comfortable shoe having a nice sensation when worn by manufacturing shoe using a last having the same shape as that of a human foot during walking has been examined in the present invention by using biomechanical data of the foot, and more particu-

larly, by a last comprising: a first protruding portion (11) which is forwardly and upwardly rounded at one side at front end of a forefoot portion (21) of the last (10), corresponding to a human big toe; a convex-concave portion (12) at the front end of the forefoot of the last, corresponding to the shapes of each of a human being's second to fifth toe.

[Fig. 1]



Description

Technical Field

[0001] The present invention relates to a last for manufacturing a various kind of the shoe such as a conventional shoe, leisure/sport shoe that enables to fit the human foot shape.

Background Art

[0002] Conventionally, the last for manufacturing a shoe has a foot shape, and is made of metal, wood or synthetic resins.

[0003] When manufacturing a shoe using the last, the process thereof is comprising attaching the uppers of the shoe in the bottom of the shoe sole in the state of the exterior of the last being covered with uppers to form shoe, and then dividing the last from a shoe. According to such a manufacturing method, the corresponding space to the last is so formed inside the shoe that a shoe provides a space to fit for the foot.

[0004] However, the conventional last is manufactured to cover overall rough shape in a simple way without considering concrete bend area such as toes or ankle bone. Thus, it causes inconvenience when it is fitted.

[0005] The reason why the conventional last is manufactured roughly resulted from the producer's mass production for cost saving method. Thus, it does not pay attention to the best convenient fitting condition with the similar shape to the foot to be fitted, but focuses on the aspect of the manufacturer or seller, which results the above problem.

[0006] From the bionics perspective, a foot consists of 23 pairs of bones, muscles, joints, ligaments, nerves and blood vessels. It is divided into the forefoot, the midfoot and the rearfoot. The forefoot consists of 5 metatarsal bones including toes, the midfoot has arch type, and the rearfoot consists of calcaneus. When walking, a heavy pressure is given to the forefoot and the rearfoot.

[0007] The first to third metatarsal bones corresponding to the big toe and the third toe are linked to the ankle, and the fourth to the fifth metatarsal bones are linked to the to the shinbone thorough the calcaneus bone.

[0008] Such a metatarsal bone constructs lateral arch to support ligament and nerve, and column arch with plantar fascia. The interaction between muscles and bones of arches makes the body stable, absorbs shocks and disperses the body weight.

[0009] However, a foot puts to receive the pressure, which may cause plantar fasciitis or interdigital neuroma. Those diseases are caused by wearing unfit shoes.

[0010] Recently, there are studies on insoles to support arch, or pad of the forefoot or the rearfoot where much pressure is given. As to the studies on insole, it mainly deals with the effect of heel, the forefoot and arch, which aim for shock absorbing and convenience of foot.

[0011] For example, when a finite element model used

by Jason Tak-Man et. al.(2007) is reviewed, we may confirm the movement of pressure in a cross section, showing the reduction of overall pressure on foot by dispersing the pressure through the support of arch. It also shows that when the pressure is continuously added, it supports arch that reduces the deformation of a foot (G. F. Kogler et. al. 1995). When the pressure is added to the sole on walking, the highest pressure is given to the forefoot and the rearfoot (Lee, Chang Min et. al 2005).

[0012] There are many studies based on the above contents, which have a common aim to give convenience to a foot through the study on pressure occurrence portion and arch shape, despite the different methodologies. However, most of them are related to the insole, but there was no study on last as yet.

[0013] As the conventional last has no as sole having a concrete shape according to the toe or top of the foot, the shoe sole cannot be fitted to body sole, which causes much movement in a shoe and leads to an inconvenient in initial wearing.

[0014] Many person having a skill in the art tried to support arch or to use pressure absorbing pad insole to solve the problem on the conventional last, but fail to an improvement because the last is manufactured with different shape of the insole and midsole respectively.

Summary of Invention

Technical Problem

[0015] In order to solve the said problems, it needs to increase the fitting feeling, as having a similar space inside a shoe as that of a foot. The present inventor made a study for an invention of manufacturing a last, based on the anatomical and bionics resources, and as a result, found that if the last is prepared with the same shape of the foot, it is possible to manufacture a shoe to have a good fitting feeling and convenience. The present invention is accomplished on the basis of the above finding.

Solution to problem

[0016] There are many different lasts depending on the various shoe types, and shoe sole should stick to the sole to give free movement inside a shoe in order to enhance fitting except for shoes such as professional inline skate or cycle shoes where a foot is fixed inside the shoe. And, every shoe should be manufactured with same material in order to achieve such aim.

[0017] Here, when trying to embody the protruding ankle bone as it stands in manufacturing the last, it slightly changes the shape of a shoe that enables to achieve the above aim. Accordingly, it focuses on the toes playing the most important role in the shoe fitting, and also the type of the sole arch, to maximize fitting, and to make a free movement inside a shoe.

Advantageous Effects of Invention

[0018] When manufacturing a last in the most similar shape with a foot, it gives a good wearing sensation like a barefoot and keeps stable wearing sensation despite a long time wearing.

[0019] In addition, the portions like a sole bone or the metatarsal bone shape, and the bone between toes and metatarsal are perfectly fixed in the shoe on wearing, giving a feeling as if it moves in a barefoot. And it prevents any foot diseases for those walking or moving for a long periods of time.

Brief Description of Drawings

[0020]

Fig. 1 is a perspective view of the last according to an embodiment of the present invention.

Fig. 2 is a perspective view of the forefoot last according to an embodiment of the present invention.

Fig. 3 is a plan view of the last according to an embodiment of the present invention.

Fig. 4 is a side view of the last according to an embodiment of the present invention (big toe).

Fig. 5 is a bottom view of the last according to an embodiment of the present invention.

Fig. 6 is a bottom view of the forefoot of the last according to an embodiment of the present invention.

< Reference Signs List >

[0021]

- 10... Last
- 11... First protruding portion
- 12... Convex-concave portion
- 13... Second protruding portion
- 14... First concave portion
- 15... Third concave portion
- 16... Second concave portion
- 17... Third protruding portion
- 21... The forefoot
- 22... The midfoot
- 23... The rearfoot

Description of Embodiments

[0022] The present inventor studies the pressure of foot and shape change in bionics resources, and reflected the said study. The present invention is characterized in its construction of the last (10) embodying human body shape as it stands. Specifically, it selectively forms the

forefoot (21) of last for manufacturing a shoe, the first protruding portion (11) in a round form at the front and upper direction corresponding to a big toe shape, convex-concave portion (12) corresponding to each protruding shapes of the second or fifth toe of the forefoot of the above last, the midfoot of the above last (22), the second protruding portion corresponding protruding bones from the midfoot internal portion to external portion, first concave portion (14) corresponding to the concave portion in arch type on the floor of the midfoot in the sole of the above last, second concave portion (16) corresponding concave on the border between toe and the midfoot in a lateral direction in the forefoot and the midfoot of the above last, third concave portion (15) corresponding concave portion to the third and fourth toes between the forefoot and the midfoot of the above last, and third protruding portion (17) corresponding to the upper protruding bone on the top of a foot on the top of the last.

20 Other Embodiments

[0023] Hereinafter, based on the attached Fig. 1 to 6, it describes the desirable last form in detail.

[0024] Fig. 1 is a perspective view of the last according to an embodiment of the present invention. Fig. 2 is a perspective view of the forefoot last according to an embodiment of the present invention. Fig. 3 is a plan view of the last according to an embodiment of the present invention. Fig. 4 is a side view of the last according to an embodiment of the present invention (big toe). Fig. 5 is a bottom view of last according to an embodiment of the present invention. And Fig. 6 is a bottom view of the forefoot of last according to an embodiment of the present invention.

[0025] As shown in Fig. 1 to 6, the last (10) of the present invention is manufactured in the same shape with a body foot especially, toes and sole. It can be manufactured with wood, synthetic resin or metal and other material can be available.

[0026] As depicted in Fig. 5, the above last (10) consists of the forefoot (21), the midfoot (22) and the rearfoot (23). The forefoot (21) is to form 5 metatarsal bonds linked to toe ones, the midfoot (22) is to form the middle portion with arch type, and the rearfoot (23) is to form calcaneus.

[0027] As a desirable example, one side of the forefoot (21) of the above last (10) has first protruding portion (11) corresponding to big toe shape, and the first protruding (11) portion is protruding in a round form to the front and upper direction as in Fig. 3 and Fig. 4.

[0028] When a shoe is manufactured using the last (10) in the first protruding portion (11), it minimizes pressure toward the big toe as the round space is formed inside, and increases fitting. In the long run, it prevents diseases like hallux valgus, a disease that big toe is bent outwards.

[0029] As depicted in the Fig. 1 to 3, according to another example of the invention, the the forefoot (21) of

the above last (10) creates corresponding protruding shapes of second or fifth toe, forming round type convex-concave portion (12) in a zigzags, and the above convex-concave portion (12) is linked to the above first protruding portion (11). More specifically, the above convex-concave portion (12) is extended to the roundly protruding portion toward first protruding portion (11) and linked in a round zigzag type.

[0030] When a shoe is manufactured using last (10) with the first protruding portion (11) and convex-concave portion (12), it fixes the big toe, the second and the fifth toes together, forms convex-concave space and increase fitting by minimizing foot movement.

[0031] As depicted in Fig. 1 to 3, according to another example of the present invention, the internal area of the midfoot (22) of the above last (10) has protruding arch type second protruding portion (13) outwards, and the second protruding portion (13) corresponds to the ball of foot, the protruding bone from inside of the midfoot toward outside.

[0032] When a shoe is manufactured using the last (10) with the second protruding portion (13), it gives convenience and no pain to those with the big ball of the foot, and prevents deformation of the fifth toe caused by the pressure of the ball of foot.

[0033] As depicted in Fig. 4 to 5, according to another example of the present invention, the internal area of the midfoot (22) of the above last (10) has the first concave portion (14) upwardly corresponding form to the arch type concave from the sole of the midfoot.

[0034] When a shoe is manufactured using last (10) with first concave portion (14), midsole of a shoe is protruding upwardly corresponding to first concave portion (14), it increases wearing feeling, since fitting feeling of the insole is same with that of the midsole.

[0035] As depicted in Fig. 1 and 4, according to another example of the present invention, top of a foot of the above last (10) has the third rounded protruding portion (17) upwardly corresponding to the upwardly protruding bones in a arch type of the top of a foot.

[0036] When a shoe is manufactured using last (10) with third protruding portion (17) of the top of the foot, it creates protruding space upper inside the shoe corresponding to the above third protruding portion (17), which minimizes pressure of the top of the foot, and increases fitting as it ties up a shoestring.

[0037] Meanwhile, the sole of body foot forms several types concaves as well as first concave portion (14) between the forefoot (toes) and the midfoot. Considering the purpose of the present invention, it is desirable to form a concave corresponding to that of sole in the base of the last.

[0038] As depicted in Fig. 4 and 6, according to another example of the present invention, the borderline between the forefoot (21) and the midfoot (22) of the above last (10), it forms lateral second concave portion (16) between toes and the midfoot.

[0039] The above second concave portion (16) em-

bodies concave against sole in the fifth toes. It shows concave in a lateral direction from the foot (Fig. 4 or 6).

[0040] As such, when a shoe is manufactured using last (10) with the second protruding portion (16), it increases fitting sensation as it can fix the whole toes because the second concave portion of the midsole is protruding laterally.

[0041] According to another example of the present invention, as showing in Fig. 6, it forms the third concave portion (15) corresponding concave to each metatarsal between third and fourth toes in the forefoot (21) and the midfoot (22) of the above last.

[0042] As mentioned above, the metatarsal bonds consist of 5 linking between the acropodium and tarsometatarsal joint. First metatarsal is linked to the big toe bone, and the fifth metatarsal is linked to the fifth toe bone. There is a concave between third and fourth toes which belong to third, fourth and fifth metatarsal bonds. The above third concave portion (15) is corresponding to the concave.

[0043] As such, when a shoe is manufactured using the last (10) with third concave portion(15), it increases fitting sensation as it can fix the whole toes subtly and stably because the second concave portion (16) and in front of mid sole are corresponding to the second and third concave area respectively.

[0044] The above explanation is made based on the restricted structure in attached drawings, but the present invention is not restricted in the examples and its structure. It can be suitably adapted to fit any necessity, and such change is included in this scope of claim.

Industrial Applicability

[0045] When manufacturing a last in the most similar shape to a foot, it gives a good wearing sensation like a barefoot and keeps stable wearing sensation despite a long time wearing.

Claims

1. In the manufacturing a last, the said last having a same shape with the human body foot shape.
2. A last according to claim 1, wherein the last (10) having the first protruding portion (11) of the upwardly and forwardly at the front end of the forefoot (21) of the above last (10), corresponding to a big toe shape of a human being.
3. A last according to claim 1, wherein the last (10) having a rounded convex-concave portion (12) at the position extended from the first protruding portion (11), and corresponding to protruding shapes of the second or fifth toe.
4. A last according to claim 1, wherein the last (10) hav-

ing the second protruding portion (13) of the arch type inside the midfoot (22) of the above last (10), corresponding to the protruding bone from inside of the human midfoot.

5

5. A last according to claim 1, wherein the last (10) having the first concave portion (14) of the arch type at the bottom of the internal area of the midfoot (22) of the last corresponding to the concave form of the arch type of the arch type at the bottom of the internal area of the human midfoot. 10
6. A last according to claim 1, wherein the last (10) having the second lateral concave portion (16) at the borderline between the forefoot (21) and the midfoot (22) of the above last (10), corresponding to concave portion between toes and the midfoot of the human body. 15
7. A last according to claim 1, wherein the last (10) having the third concave portion (15) between the forefoot (21) and the forefoot (21) of the above last (10), corresponding to concave portion between third and fourth toes of the human body. 20
8. A last according to claim 1, wherein the last (10) having the third protruding portion (17) on the top of the last (10) corresponding to the upwardly protruding bone of the arch type on the top of the human foot. 25

30

35

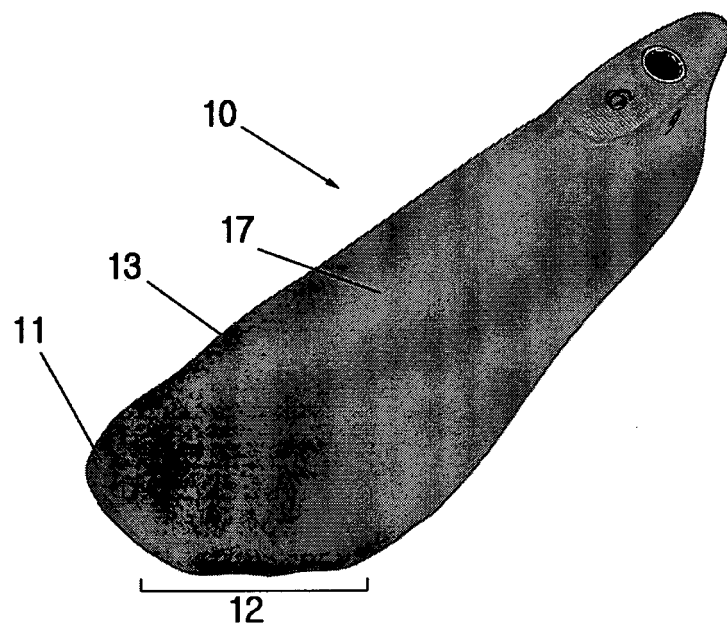
40

45

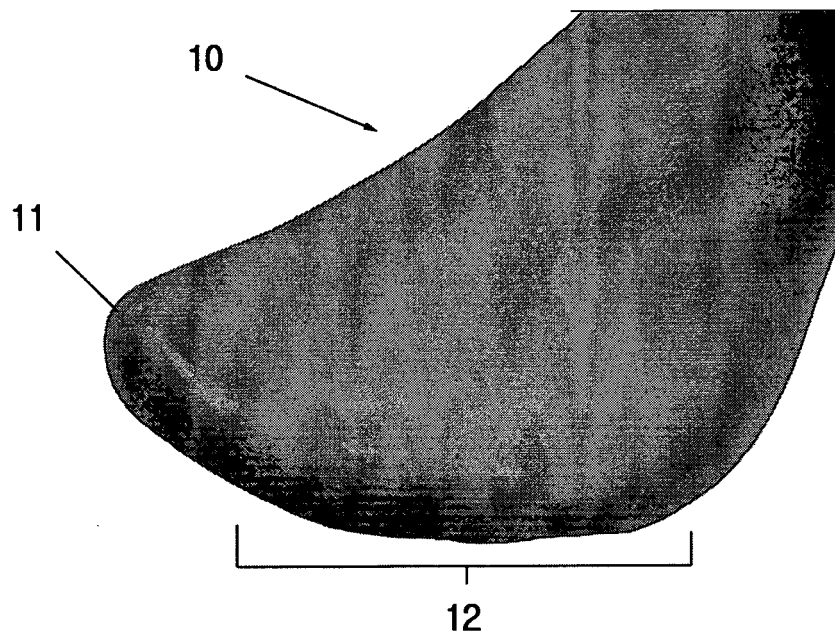
50

55

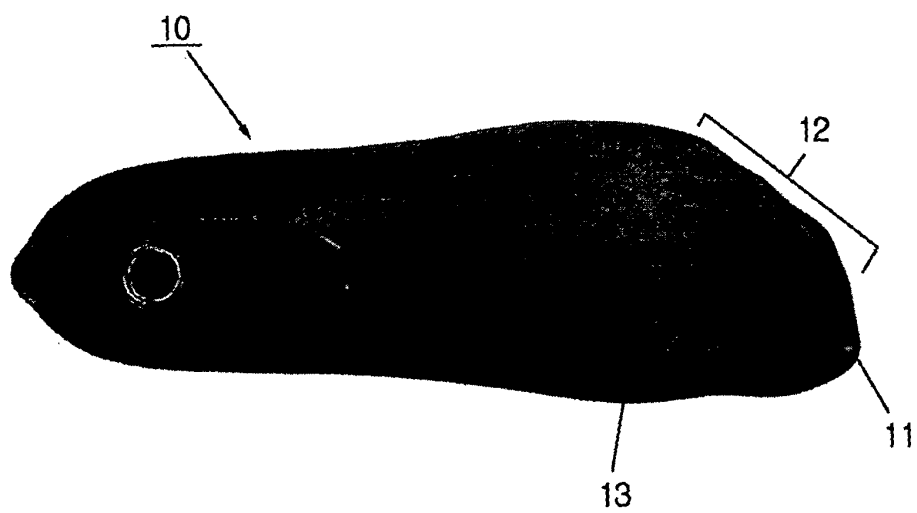
[Fig. 1]



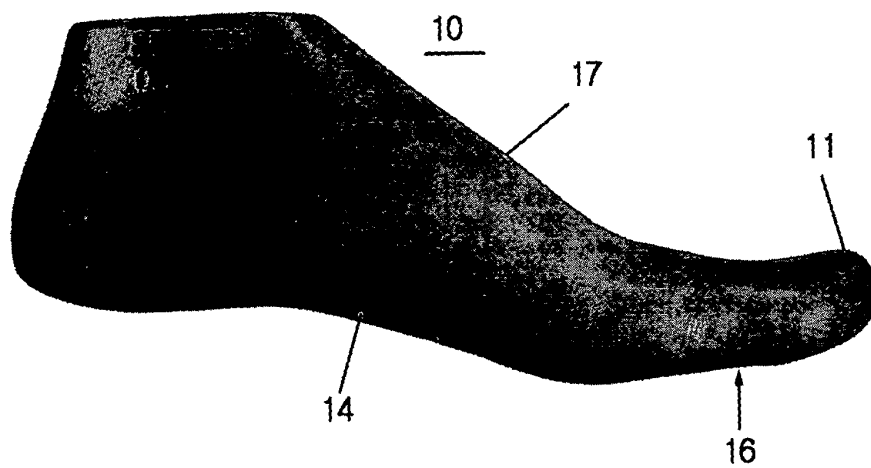
[Fig. 2]



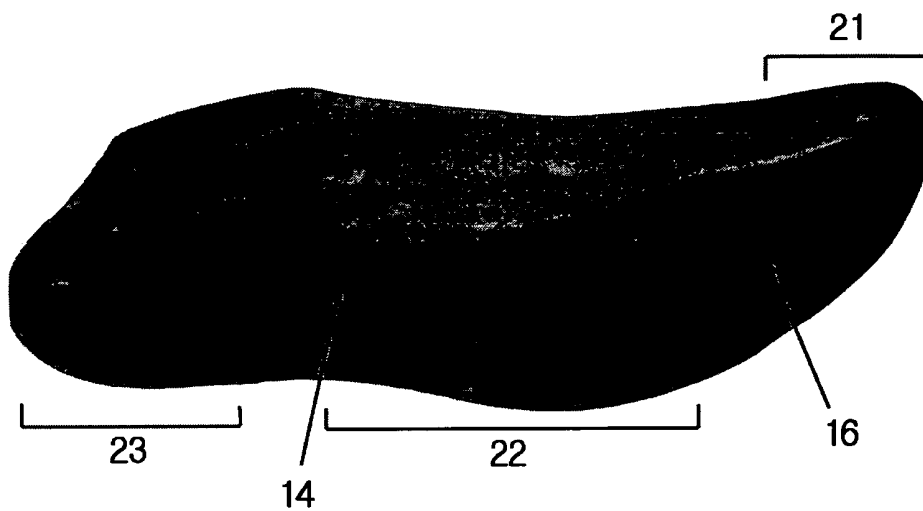
[Fig. 3]



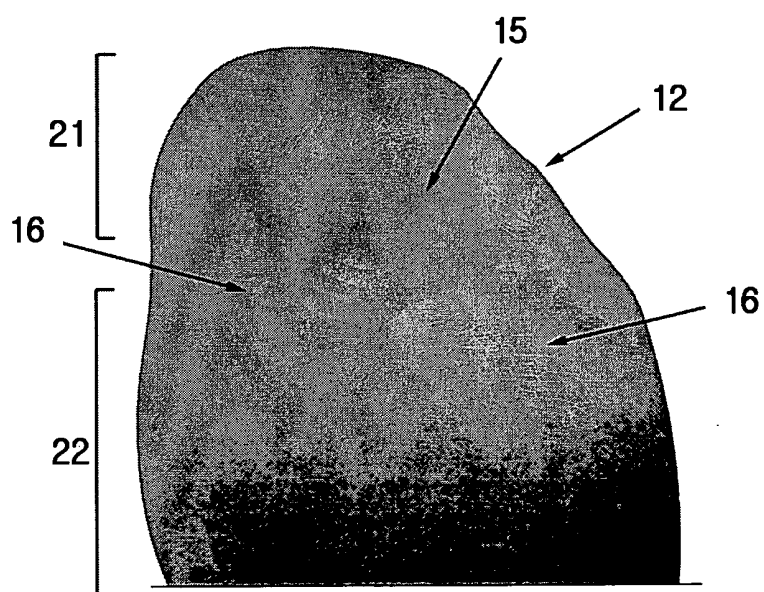
[Fig. 4]



[Fig. 5]



[Fig. 6]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2009/003337

A. CLASSIFICATION OF SUBJECT MATTER		
A43D 3/02(2006.01)i		
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) A43D 3/02; B23Q 35/04		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean Utility models and applications for Utility models: IPC as above Japanese Utility models and applications for Utility models: IPC as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS (KIPO internal) & Keywords: shoes, last, human body		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5718013 A1 (Jerry F. Gumbert) 17 February 1998 See column 12, line 12 - column 14, line 53 and figures 1-3	1,5,8
X	JP 2005-040544 A (WASHISU EIICHI; WASHISU KIMIKO) 17 February 2005 See page 3, lines 8-25 and figures 1-3, 5	1-4
A	KR 20-0206622 Y1 (HAM, KYUNG MAN) 01 December 2000 See claim 1 and figure 2	1-8
A	KR 20-0356240 Y1 (KWAK, OH RYEN) 14 July 2004 See claims 1, 4 and figure 4a	1-8
☐ 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 "E" earlier application or patent 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 09 JUNE 2010 (09.06.2010)		Date of mailing of the international search report 10 JUNE 2010 (10.06.2010)
Name and mailing address of the ISA/  Korean Intellectual Property Office Government Complex-Daejeon, 139 Seonsa-ro, Daejeon 302-701, Republic of Korea Facsimile No. 82-42-472-7140		Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2008)

EP 2 433 517 A1

INTERNATIONAL SEARCH REPORT Information on patent family members

International application No.
PCT/KR2009/003337

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5718013 A1	17.02.1998	US 6014824 A1 WO 93-19633 A1	18.01.2000 14.10.1993
JP 2005-040544 A	17.02.2005	NONE	
KR 20-0206622 Y1	01.12.2000	NONE	
KR 20-0356240 Y1	14.07.2004	NONE	

Form PCT/ISA/210 (patent family annex) (July 2008)