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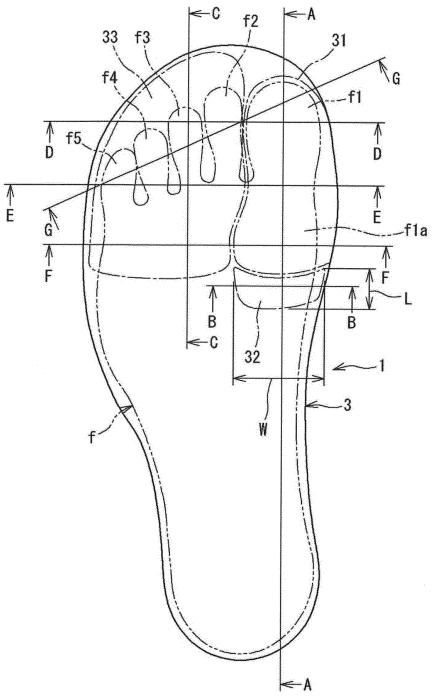
(54) **FOOTWEAR**

(57) A concave portion (31) for reducing the weight load of the wearer acting on the big toe (f1) is formed at a region in an insole (3) of a shoe (1). The region corresponds to a first site ranging from the ball (f1a) of the big toe (f1) to the tip of the toe. Further, at a region corresponding to a second site adjacent to the heel side of the ball of the big toe (f1a), a pressing portion (32) is formed for pressing the second site, so that the reaction force occurring by the pressing causes the first site to sink in the concave portion (31).

FIG. 1



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Description

TECHNICAL FIELD

[0001] The present invention relates to footwear for alleviating pain in foot caused by hallux valgus.

BACKGROUND ART

[0002] In recent years, an increasing number of people are suffering from hallux valgus, which is developed by continuous use of shoes not fitting to feet such as high-heeled women's shoes. Hallux valgus refers to the symptom in which the big toe is in a laterally deviated state. That is, the tip of the big toe deflects toward the small toe side, while the root portion of the big toe is bent in a "V"-shape, to project toward the medial side in the foot width direction. As the symptom of the hallux valgus progresses, sharp pain may be caused by the root portion of the big toe being brought into contact with the insole of the shoe. This may hinder walking.

[0003] Conventionally, as footwear for alleviating such pain in the foot caused by hallux valgus, what is known is footwear in which a concave portion is formed at the insole at the position corresponding to the big toe (for example, see Patent Literature 1) . The footwear is capable of reducing a weight load of a wearer acting on the big toe by the concave portion. Therefore, it can alleviate the pain in the foot while walking.

CITATION LIST

PATENT LITERATURE

[0004]

Patent Literature 1: Japanese Examined Patent Publication JP 4-020 608 B.

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0005] The conventional footwear can alleviate pain in the foot caused by hallux valgus. However, since the big toe itself is still in the laterally deviated state, the symptom of the hallux valgus itself cannot be improved. Further, since the lateral deviation portion of the big toe is brought into contact with the sidewall portion of the shoe, the pain in the foot cannot be fully alleviated.

The present invention has been made in consideration of such circumstances, and an object of the present invention is to provide footwear capable of improving the symptom of hallux valgus while fully alleviating the pain in the foot caused by hallux valgus.

SOLUTION TO PROBLEM

[0006] Footwear of the present invention for achieving the object stated above includes: a concave portion formed at an insole at a position corresponding to a first site ranging from a ball of a big toe to a tip of the toe for alleviating a weight load of a wearer acting on the big toe; and a pressing portion formed at the insole at a position corresponding to a second site being adjacent to a heel side of the ball of the big toe for pressing the second site, a reaction force occurring by the pressing causing the first site to sink in the concave portion.

[0007] With the footwear of the present invention, the concave portion formed at the insole at the position corresponding to the first site ranging from the ball of the big toe to the tip of the toe can reduce the weight load of the wearer acting on the big toe. Further, the pressing portion formed at the insole presses the second site being adjacent to the heel side of the ball of the big toe. The reaction force caused by the pressing allows the first site to sink in the concave portion.

Accordingly, the big toe naturally enters the medially deviated state, to approximate the original normal state from the laterally deviated state. Thus, the symptom of hallux valgus can be improved. Furthermore, since it becomes possible to suppress the big toe from being brought into contact with the sidewall portion of the shoe, the pain in the foot can be further alleviated.

[0008] Further, it is preferable that the footwear further includes a lifting portion formed at the insole at a position corresponding to four toes except for the big toe, for lifting the four toes.

In this case, since the four toes except for the big toe are lifted by the lifting portion, the clearance between each adjacent ones of the four toes can be widened. Thus, even in the state where the first site of the big toe sinks in the concave portion as described above, the weight of the wearer can be supported by the four toes in a stable state.

[0009] Still further, it is preferable that the lifting portion is formed to become gradually high from a second toe toward a small toe both included in the four toes, to cause a straight line connecting top ends of the four toes to be substantially horizontal.

In this case, since the straight line connecting the top ends of the four toes lifted by the lifting portion becomes substantially horizontal, it becomes possible to allow the weight load of the wearer to act on the four toes substantially uniformly. Thus, the weight of the wearer can be supported by the four toes in a further stable state.

[0010] Still further, it is preferable that the lifting portion is provided with a projecting portion at the insole at a position corresponding to a clearance between a third toe and a fourth toe both included in the four toes, for widening the clearance.

In this case, since the projecting portion widens the clearance between the third toe and the fourth toe, the weight load of the wearer can be shared by a pair of two toes,

i.e., the second toe and the third toe, and another pair of toes, i.e., the fourth toe and the small toe. Thus, weight of the wearer can be supported in a further stable state.

BRIEF DESCRIPTION OF DRAWINGS

[0011]

FIG. 1 is a plan view showing an insole of footwear according to one embodiment of the present invention.
FIG. 2 is a cross sectional view taken along A-A in FIG. 1.
FIG. 3 is a cross sectional view taken along B-B in FIG. 1.
FIG. 4 is a cross sectional view taken along C-C in FIG. 1.
FIG. 5A is a cross sectional view taken along D-D in FIG. 1.
FIG. 5B is a cross sectional view taken along E-E in FIG. 1.
FIG. 5C is a cross sectional view taken along F-F in FIG. 1.
FIG. 6 is a cross sectional view taken along G-G in FIG. 1.
FIG. 7 is a drawing-substituting photograph showing the state of a foot before wearing the footwear.
FIG. 8 is a drawing-substituting photograph showing the state of the foot wearing the footwear.

DESCRIPTION OF EMBODIMENTS

[0012] Next, with reference to the accompanying drawings, a description will be given of the preferred embodiment of the present invention. FIG. 1 is a plan view showing a left- foot insole of footwear according to one embodiment of the present invention. FIG. 2 is a cross sectional view taken along A- A in FIG. 1.

In FIG. 1, an insole 3 of a shoe 1 being the footwear according to the present embodiment includes a concave portion 31 formed at the region corresponding to the big toe f1 of the foot f, a pressing portion 32 formed so as to be adjacent to the concave portion 31, and a lifting portion 33 formed at the region corresponding to the four toes f2 to f5 except for the big toe f1. Here, the "insole" refers to the element positioned at the bottom plane inside the footwear, and it includes a shoe insert placed on the bottom plane.

[0013] In a planar view according to FIG. 1, the concave portion 31 is formed at the region corresponding to a first site ranging from the ball f1a of the big toe f1 to the tip of the toe. As shown in FIG. 2, the cross-sectional shape of the concave portion 31 in the foot length direction (in the direction from the tip of toe to the heel) is formed so as to conform to the ventral side shape of the big toe f1.

More specifically, in connection with the concave portion 31, the portion corresponding to the ball f1a of the big toe f1 is depressed the most deepest, and the portion corresponding to the ventral portion f1b of the big toe f1 toward the tip of the toe is formed to be gradually shallower accordingly.

[0014] In the planar view according to FIG. 1, the pressing portion 32 is formed at the region corresponding to a second site adjacent to the heel side of the ball of the big toe f1a. The pressing portion 32 is configured to press the second site, so that the reaction force occurring by the pressing causes the first site to sink in the concave portion 31. The pressing force to the second site is set to be greater than the force exerted by a level plane naturally pressing the second site when the foot f is placed on the level plane.

[0015] Further, such sinking of the first site is realized by using the phenomenon of the first site naturally sinking in response to the pressing, which is performed by the pressing portion 32, acting on the tendon (abductor hallucis) connecting between the second site and the first site. The length L of the pressing portion 32 in the foot length direction is set to approximately 18 mm, and the length W in the foot width direction is set to approximately 50 mm.

As shown in FIG. 2, the cross- sectional shape of the pressing portion 32 in the foot length direction is formed as an inclined plane becoming gradually higher from the concave portion 31 toward the heel side.

[0016] FIG. 3 is a cross sectional view taken along B-B in FIG. 1. As shown in FIG. 3, the pressing portion 32 is formed to have a cross-sectional shape in the foot width direction in which the portion from the lateral side (the left side in FIG. 3) to the center portion is substantially flat and the end on the medial side (the right side in FIG. 3) projects upward.

[0017] In the planar view according to FIG. 1, the lifting portion 33 is formed at the region ranging from the tip of each of the second toe f2, the third toe f3, the fourth toe f4 and the small toe f5, through the root portion of the four toes f2 to f5, to the peripheral portion of the root portion of the four toes f2 to f5 on the heel side.

[0018] FIG. 4 is a cross sectional view taken along C-C in FIG. 1. As shown in FIG. 4, the lifting portion 33 is formed to have a cross-sectional shape in the foot length direction of an inclined plane, which becomes gradually higher from the heel side (the left side in FIG. 4) toward the tip (the right side in FIG. 4) of the four toes f2 to f5. Thus, the lifting portion 33 lifts the four toes f2 to f5. The lifting force is set to be greater than the force of a level plane naturally pressing the four toes f2 to f5 when the foot f is placed on the level plane.

[0019] FIG. 5A is a cross sectional view taken along D-D in FIG. 1, FIG. 5B is a cross sectional view taken along E-E in FIG. 1, and FIG. 5C is a cross sectional view taken along F-F in FIG. 1. In FIGs. 5A to 5C, the cross-sectional shape of the lifting portion 33 in the foot width direction is formed as an inclined plane being continuous from the concave portion 31, i.e., becoming gradually

higher from the second toe f2 toward the small toe f5. As shown in FIG. 5A, the inclination angle of the lifting portion 33 is set such that a straight line X connecting the top ends on the dorsal side of the four toes f2 to f5 becomes substantially horizontal.

[0020] FIG. 6 is a cross sectional view taken along G-G in FIG. 1. As shown in FIG. 6, in the lifting portion 33, a projecting portion 33a is formed at the region corresponding to the clearance between the third toe f3 and the fourth toe f4. The projecting portion 33a is configured to widen the clearance between the third toe f3 and the fourth toe f4.

[0021] With the shoe 1 according to the present embodiment structured as described above, the insole 3 is provided with the concave portion 31 at the portion corresponding to the first site ranging from the ball f1 a of the big toe f1 to the tip of the toe. Therefore, the weight load of the wearer acting on the big toe f1 can be reduced, and the pain in the foot f can be alleviated.

Further, the pressing portion 32 formed at the insole 3 presses the second site adjacent to the heel side of the ball of big toe f1a. The reaction force caused by the pressing allows the first site to sink in the concave portion 31. Accordingly, the big toe f1 naturally enters the medially deviated state, to approximate the original normal state from the laterally deviated state. Thus, the symptom of hallux valgus can be improved. Furthermore, since it becomes possible to suppress the big toe f1 from being brought into contact with the sidewall portion of the shoe 1, the pain in the foot f can be further alleviated.

[0022] Further, since the four toes f2 to f5 except for the big toe f1 are lifted by the lifting portion 33, the clearance between each adjacent ones of the four toes f2 to f5 can be widened. Thus, even in the state where the first site of the big toe f1 sinks in the concave portion 31, the weight of the wearer can be supported by the four toes f2 to f5 in a stable state.

[0023] Still further, since the straight line X connecting the top ends on the dorsal side of the four toes f2 to f5 lifted by the lifting portion 33 becomes substantially horizontal, it becomes possible to allow the weight load of the wearer to act on the four toes f2 to f5 substantially uniformly. Thus, the weight of the wearer can be supported by the four toes f2 to f5 in a further stable state.

[0024] Still further, since the projecting portion 33a formed at the lifting portion 33 makes it possible to widen the clearance between the third toe f3 and the fourth toe f4, the weight load of the wearer can be shared by a pair of two toes, i.e., the second toe f2 and the third toe f3, and another pair of two toes, i.e., the fourth toe f4 and the small toe f5. Thus, the weight of the wearer can be supported in a further stable state.

[0025] Note that the present invention is not limited to the embodiment described above. For example, though a shoe has been exemplarily shown as the footwear in the embodiment described above, the present invention is applicable also to footwear such as sandals, straw sandals, split-toed socks, wooden clogs or slippers.

[0026] FIGS. 7 and 8 show the result of comparison verification as to the change in hallux valgus of a foot between before and after wearing the shoe according to the embodiment described above. FIG. 7 is a drawing-substituting photograph showing the state of a foot before wearing the shoe, and FIG. 8 is a drawing-substituting photograph showing the state of the foot wearing the shoe. The shoe in the photograph is shown only by the insole, so that the foot can be easily observed.

[0027] With the foot shown in FIG. 7, it can be seen that the big toe is in the laterally deviated state, that is, the tip of the big toe is deflected toward the small toe, and the root portion of the big toe is bent in a "V"-shape, to project toward the medial side in the foot width direction (the left side in FIG. 7).

[0028] On the other hand, as compared to FIG. 7, the root portion of the big toe shown in FIG. 8 is suppressed from being projecting toward the medial side in the foot width direction, and it can be seen that the symptom of hallux valgus is improved. Further, it can be seen that, in connection with the four toes except for the big toe shown in FIG. 8, the clearance between each adjacent ones of the toes is widened, as compared to FIG. 7. In particular, it can be seen that the widened clearance between the third toe and the fourth toe is considerably wider than the clearance shown in FIG. 7.

LIST OF REFERENCE SIGNS

[0029]

1	= SHOE (FOOTWEAR)
3	= INSOLE
31	= CONCAVE PORTION
32	= PRESSING PORTION
33	= LIFTING PORTION
33a	= PROJECTING PORTION
f1	= BIG TOE
f1a	= BALL OF BIG TOE
f2	= SECOND TOE
f3	= THIRD TOE
f4	= FOURTH TOE
f5	= SMALL TOE
X	= STRAIGHT LINE

Claims

1. A footwear comprising:

- a concave portion formed at an insole at a position corresponding to a first site ranging from a ball of a big toe to a tip of the toe for alleviating a weight load of a wearer acting on the big toe; and
- a pressing portion formed at the insole at a position corresponding to a second site being adjacent to a heel side of the ball of the big toe

for pressing the second site, a reaction force occurring by the pressing causing the first site to sink in the concave portion.

2. The footwear according to claim 1, further comprising a lifting portion formed at the insole at a position corresponding to four toes except for the big toe, for lifting the four toes.

3. The footwear according to claim 2, wherein the lifting portion is formed to become gradually high from a second toe toward a small toe both included in the four toes, to cause a straight line connecting top ends of the four toes to be substantially horizontal.

4. The footwear according to claim 3, wherein the lifting portion is provided with a projecting portion at the insole at a position corresponding to a clearance between a third toe and a fourth toe both included in the four toes, for widening the clearance.

FIG. 1

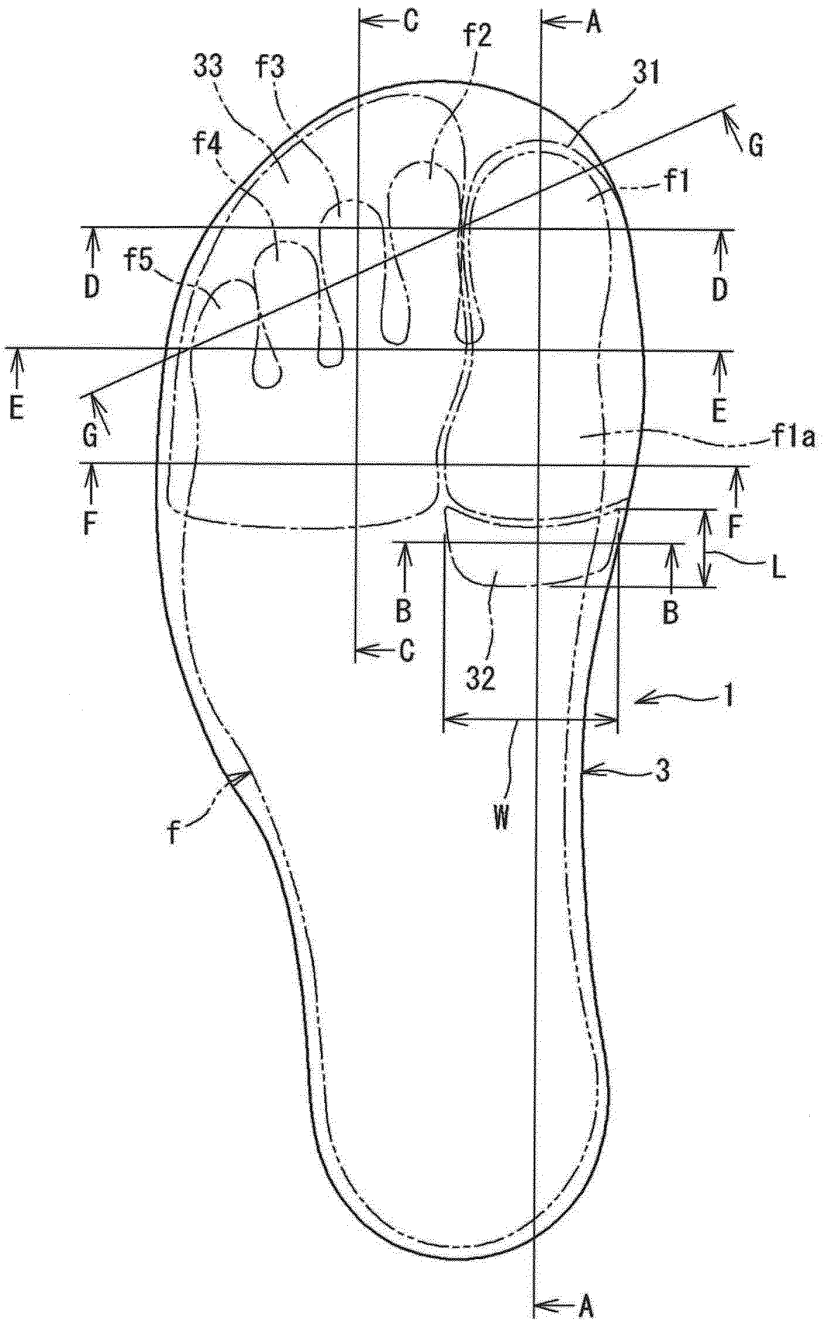

FIG. 2

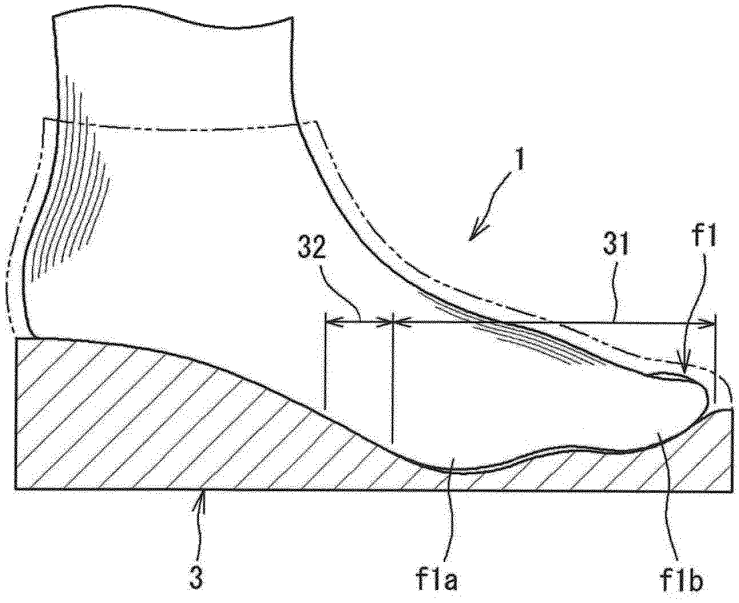

FIG. 3

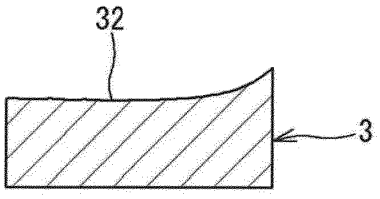

FIG. 4

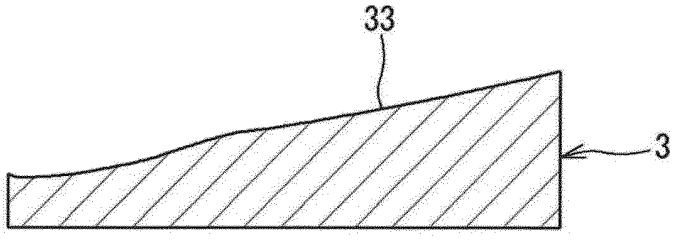

FIG. 5A

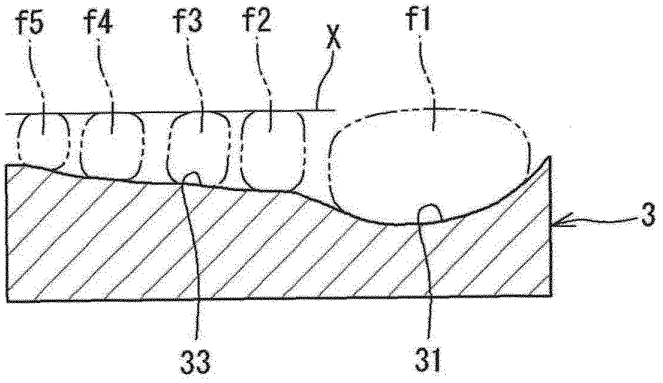

FIG. 5B

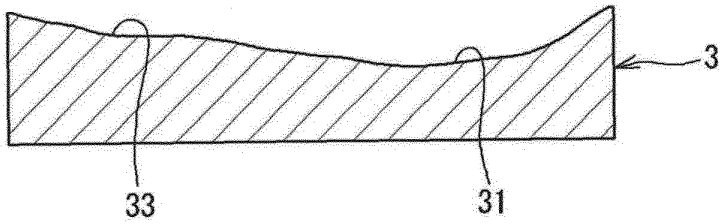

FIG. 5C

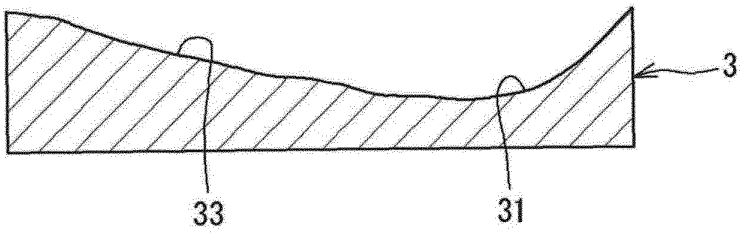

FIG. 6

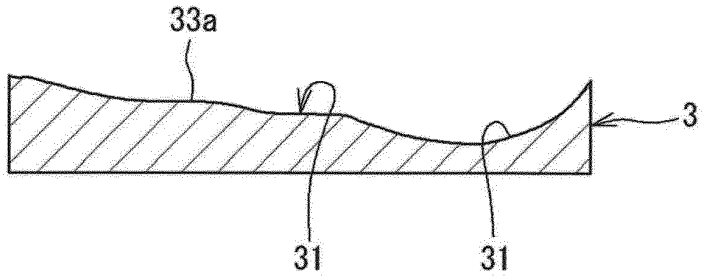

FIG. 7

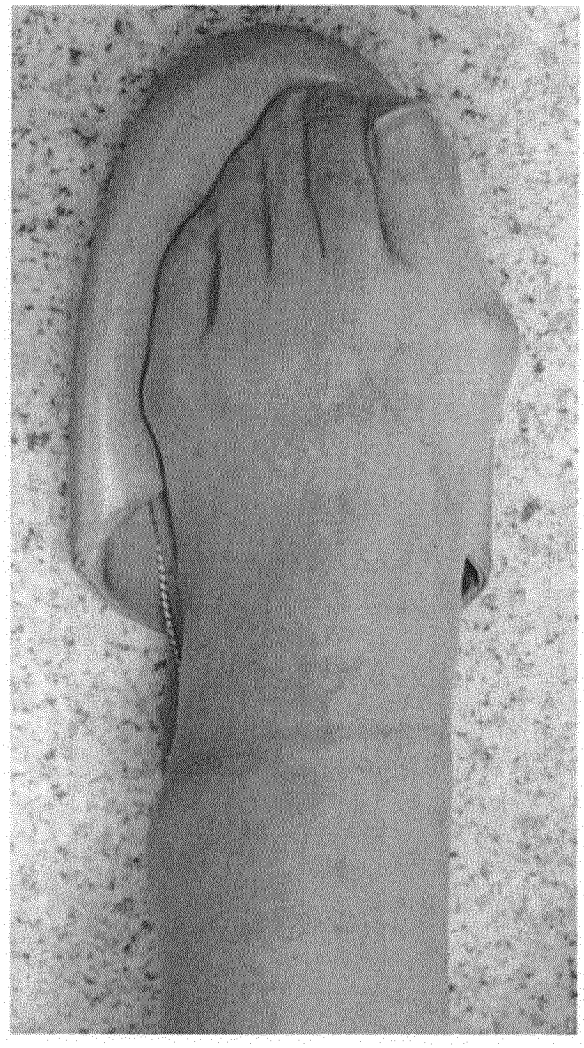

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/053490

A. CLASSIFICATION OF SUBJECT MATTER
A43B13/14(2006.01)i, *A43B7/14*(2006.01)i, *A43B7/26*(2006.01)i, *A43B7/28*(2006.01)i, *A43B13/38*(2006.01)i, *A43B17/00*(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)
A43B1/00-23/30

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2011
Kokai Jitsuyo Shinan Koho 1971-2011 Toroku Jitsuyo Shinan Koho 1994-2011

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y A	JP 2006-198399 A (Hideki IKEHARA), 03 August 2006 (03.08.2006), paragraphs [0001], [0025]; fig. 1 to 3 (Family: none)	1-2 3-4
Y A	WO 2010/131720 A1 (Kobayashi Pharmaceutical Co., Ltd.), 18 November 2010 (18.11.2010), paragraph [0010]; fig. 5 (Family: none)	1-2 3-4
A	US 2828555 A (Maurice Emile Auguste Ledos), 01 April 1958 (01.04.1958), all drawings & GB 761168 A & FR 1069205 A	3-4

☒ 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)
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"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
13 May, 2011 (13.05.11)	24 May, 2011 (24.05.11)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2011/053490

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 97/41749 A1 (PAYLESS SHOESOURCE, INC.), 13 November 1997 (13.11.1997), all drawings & AU 3119697 A	3-4

Form PCT/ISA/210 (continuation of second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 4020608 B **[0004]**