(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
31 January 2008 (31.01.2008)

PCT

(10) International Publication Number
WO 2008/012809 A2

(51) International Patent Classification:
A43B 13/04 (2006.01)

(21) International Application Number:
PCT/IL2007/000923

(22) International Filing Date: 23 July 2007 (23.07.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/820,118 24 July 2006 (24.07.2006) US

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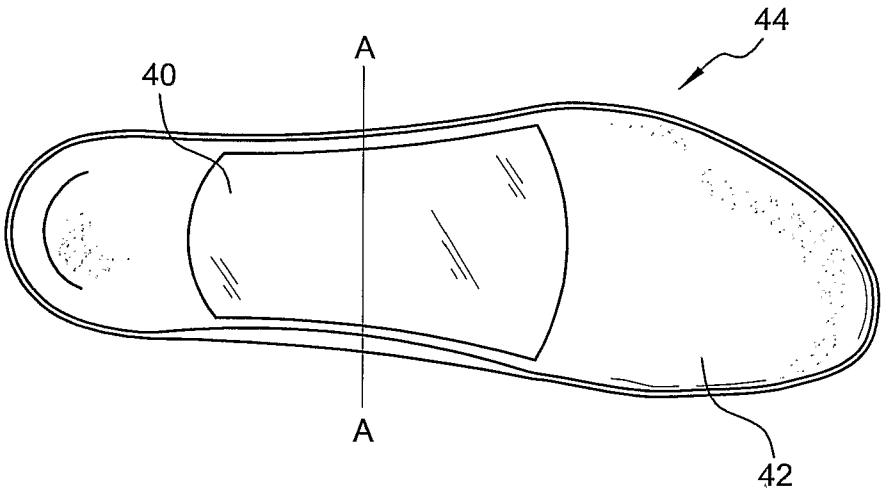
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

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

(54) Title: ADAPTABLE ORTHOPEDIC INSOLES



(57) Abstract: An orthopedic insole consists of a hollow foothold having flexible walls and containing granular filling. The upper surface of the orthopedic insole is typically molded to conform the anatomical features of a regular human foot. The granular filling contained in the lumen of the foothold and a rigid segment of its bottom wall provide for adapting the curvature angles of the top surface of the foothold to a specific pattern of the foot of a user. A user can typically make a selection from a variety of ready-made insoles having standard sizes which suit his needs. The adaptable orthopedic insoles of the invention are accommodated to common shoes and sandals, boots that are suitable for heavy work, walking, running, and or fashionable or mode shoes.

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ADAPTABLE ORTHOPEDIC INSOLES

FIELD OF THE INVENTION

The present invention relates in general to orthopedic and in particular to orthopedic insoles accommodated to a variety of footwear and adaptable to the foot of a user.

BACKGROUND OF THE INVENTION

A significant portion of the population suffers from irregular or abnormal foot pattern, which are typically associated with physical discomfort induced by prolonged standing, walking and or running. Orthopedic shoes may in such cases be offered as a relief from the physical discomfort. Orthopedic insoles tailored to a user foot and specific footwear normally provide for converting common footwear into orthopedic. However an expert is typically involved with the manufacturing of orthopedic insoles. Furthermore the adaptation of orthopedic insoles to the user's feet is often associated with revisiting the expert for the accommodation and fine-tuning.

The characteristics of healthy and normal feet are prone to change by aging, which in turn might cause such physical discomfort as well. Therefore ready made

orthopedic insoles, which are adaptable to the user's feet and are conformal with a variety of footwear are called for.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is an isometric view of an orthopedic insole according to a preferred embodiment of the present invention;

Fig. 2 is an isometric view of the orthopedic insole shown in Fig.1 in which its bottom face is shown;

Fig. 3 is transverse sectional view of a foothold of the orthopedic insole shown in Fig. 1;

Fig. 4 is an isometric view of an orthopedic insole according to another embodiment of the present invention;

Fig. 5 is a flow chart describing a method for manufacturing an orthopedic insole in accordance with a preferred embodiment of the present invention;

DETAILED DESCRIPTION OF THE PRESENT INVENTION

In accordance with the present invention an adaptable orthopedic insole is provided. The orthopedic insole of the invention consists of a hollow foothold having flexible walls and containing granular filling. The upper surface of an orthopedic insole of the invention is typically molded to conform the anatomical features of a regular human foot. The granular filling contained in the lumen of the foothold and a rigid segment of its bottom wall provide for adapting the curvature angles of the top surface of the foothold to a specific pattern of the foot of a user. A user can typically make a selection from a variety of ready-made insoles having standard sizes which suit his needs. The adaptable orthopedic insoles of the invention are accommodated to common shoes and sandals, boots that are suitable for heavy work, walking, running, and or fashionable or mode shoes.

Reference is now made to **Figs 1 - 3** in which two isometric views of an adaptable orthopedic insole and a sectional view of its foothold according to a preferred embodiment of the present invention are respectively shown. Adaptable orthopedic insole **10** has inner face **12** and outer end **14**, tarsal support **16**, an optional metatarsal support **18** sloping upwards and medial arc support **20**. Medial arc support **20** slopes longitudinally towards outer end **14**. Elongated rigid plate **40** is embedded in bottom face **42** of adaptable orthopedic insole **44**. The frontal and rear segments of bottom face **42** are uncovered by rigid plate **40** permitting the deformation of the corresponding portions of adaptable insole **44** concomitantly with respective rotational movements of the tarsal and metatarsal portions of a user.

In **Fig. 3** a sectional view along line AA of a foothold of the adaptable orthopedic insole shown in **Fig. 2** is shown. Upper face **60** of the foothold **62** of the orthopedic insole downwardly slopes from inner wall **64** towards outer wall **66**. Rigid plate **68** is embedded in the outside face of bottom wall **70** of foothold **62**. The foothold of adaptable orthopedic insoles of the invention is made of flexible materials. Footholds are manufactured in standard sizes and shapes such as by blow molding utilizing PVC, polyethylene, or other plastic resins. Rigid plates are manufactured also in standard sizes and are typically made of metal such as aluminum. The rigid plates are typically attached into conformal recesses located at the external surface of the bottom face of the foothold. The footholds are typically further covered such as by fabric, leather, neoprene, and nylon or similar plastic resins. The lumen of a foothold of adaptable orthopedic insole of the invention is filled with granular material such as polyethylene through a dedicated filling aperture that is typically located at a sidewall. The volume of the filling is typically lower by a few percents from the capacity of the hollow foothold. Attaching such as by gluing conformal cover to the filling aperture then closes the filling within the lumen of an insole. Air vents whose sizes are smaller than the sizes of the grains of the filling, located across sidewalls such as inner wall **64** and outer end **66** permit slow equalizing of internal air pressure with the atmosphere when the insoles are pressed by the weight of a user, thereby providing a cushioning effect.

The adaptable orthopedic insoles of the invention are accommodated to any shoe or sandal that surrounds a significant portion of the foot of a user. However in cases in which footwear that are open near the fingers and or the ankle, a substantially shallow recess located at the inner sole of the footwear and

conformal with the bottom surface of the insole has to be first provided. Such a recess provides for keeping the adaptable orthopedic insole in place while being in use.

In another embodiment of the invention the insole is short, covering only a part of the footwear as shown in **Fig. 4** to which reference is now made. Elongated rigid plate **74** is embedded in the bottom face of the adaptable orthopedic insole. With respect to orthopedic insole shown in **Fig. 2** the front segment of the orthopedic insole has been removed, in this case by transverse cut **80**. Rear segment **82** of the bottom face of the adaptable orthopedic insole is not covered by rigid plate **74**, as in the other embodiments, permitting a deformation of the corresponding portions of adaptable insole concomitantly with the respective rotational movement of the tarsal and metatarsal portion of a wearer.

A flow chart describing a method for manufacturing an orthopedic insole in accordance with a preferred embodiment of the present invention is described in **Fig. 5** to which reference is now made. At step **90** a mold in standard shape for an orthopedic insole is provided. At step **92** a moldable material such as PVC, polyethylene, or any other suitable plastic resin is injected to the mold. At step **94** a process of blow molding (BM) is provided, in which the injected plastic resin is blown. At step **96** the hollow insole that is formed in the molding process is released from the mold. Then, at step **98** the hollow insole is filled with granular material and in step **99** the area of the injection is sealed. At step **100** the foothold is covered such as by fabric, leather, neoprene, nylon or similar plastic resins. At step **102** a rigid plate is attached in bottom face of orthopedic insole.

It should be noted that some steps of the above described process can be combined, executed repeatedly, omitted and/or rearranged.

CLAIMS

1 An adaptable orthopedic insole for footwear comprising

- a hollow foothold having a medial arc support, a tarsal support, a bottom wall and sidewalls;
- a rigid plate embedded in a segment of said bottom wall;
- a granular filling disposed in a lumen of said foothold, and

wherein at least one wall of said foothold is flexible, and wherein at least one pore is located at a sidewall of said hollow foothold, and wherein the size of said at least one pore is somewhat smaller than the size of any grain of said granular filling.

2 An adaptable orthopedic insole such as in claim 1, wherein said foothold is covered.

3 An adaptable orthopedic insole such as in claim 1, wherein said foothold is manufactured in standard sizes and shapes.

4 An adaptable orthopaedic insole such as in claim 1, wherein the length of said insole is shorter than the length of said footwear.

5 A method for manufacturing an adaptable orthopedic insole comprising:

- providing mold for standard orthopaedic insole;
- injecting a moldable material to said mold;
- blow molding said injected material;
- releasing said blown injected material from said mold;
- filling said blown injected material with granular material;
- sealing area of said injection;
- covering the upper face of said blown injected material with a material selected from a group consisting of fabric, leather, neoprene, nylon, similar plastic resins or any combination thereof, and
- attaching a rigid plate in bottom face of sad blown injected material.

6 A method for manufacturing an adaptable orthopaedic insole as in claim 5, further comprising air vents which are smaller than said grains of the filling located along side walls of said blown injected material.

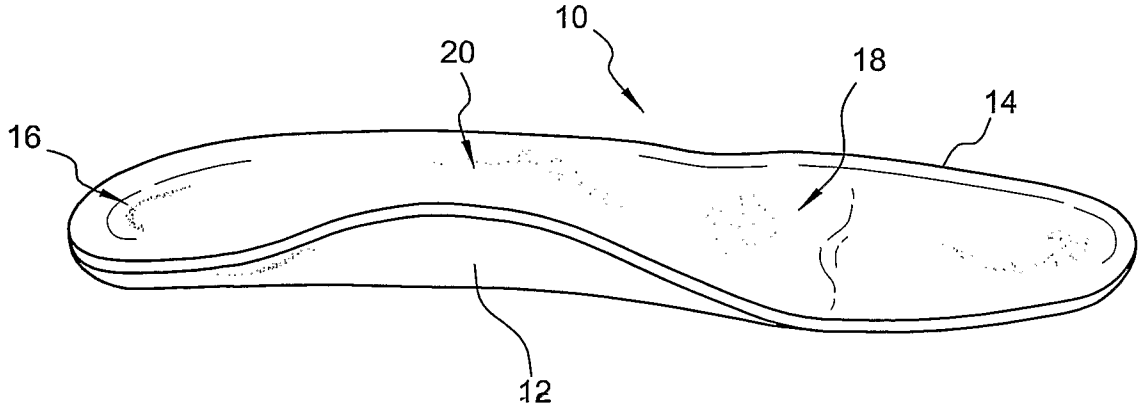

Fig. 1

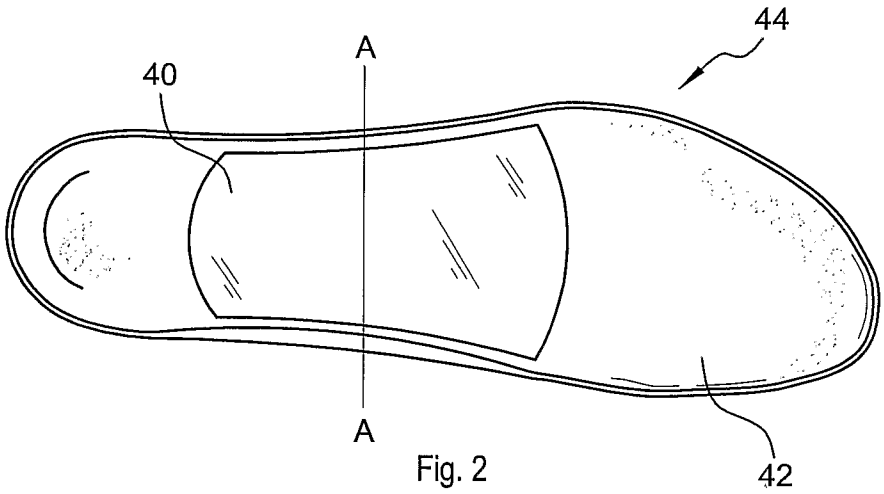

Fig. 2

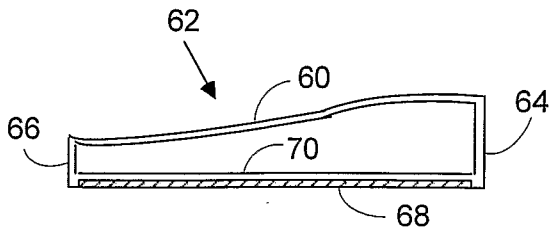

Fig. 3

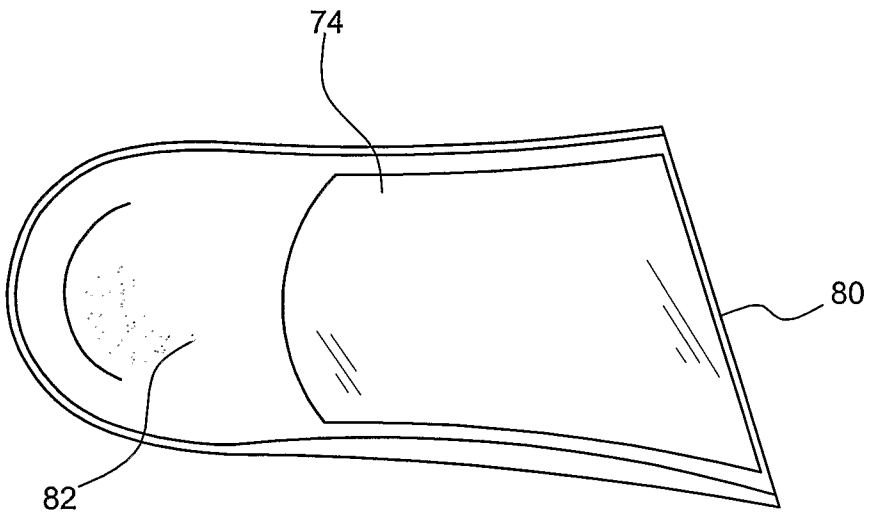

Fig. 4

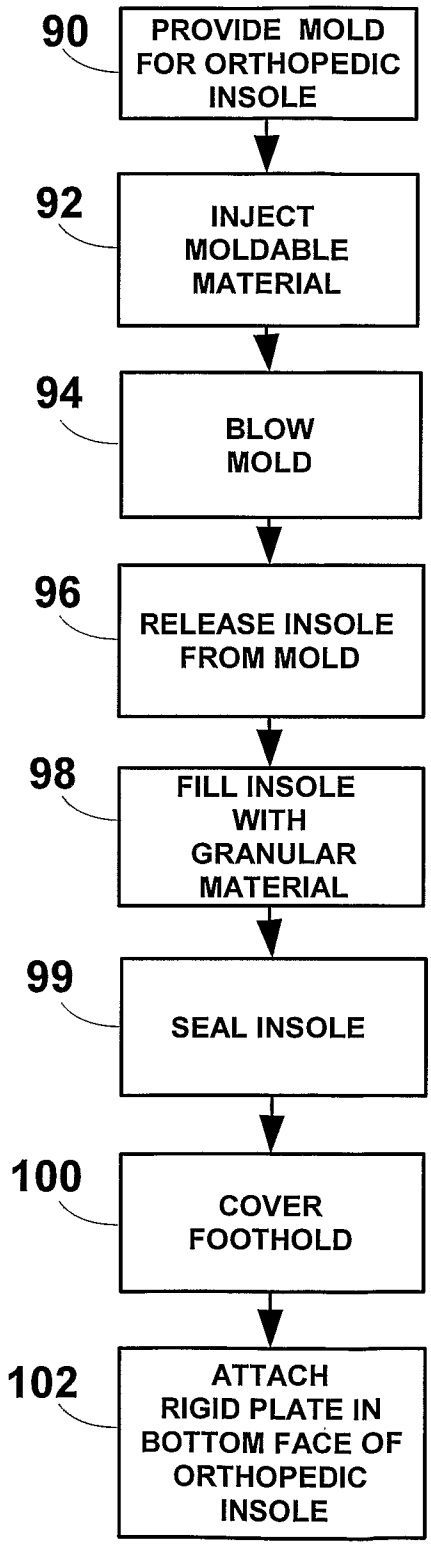
90
PROVIDE MOLD FOR ORTHOPEDIC INSOLE
92
INJECT MOLDABLE MATERIAL
94
BLOW MOLD
96
RELEASE INSOLE FROM MOLD
98
FILL INSOLE WITH GRANULAR MATERIAL
99
SEAL INSOLE
100
COVER FOOTHOLD
102
ATTACH RIGID PLATE IN BOTTOM FACE OF ORTHOPEDIC INSOLE

Fig. 5