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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
27 January 2011 (27.01.2011)

PCT

(10) International Publication Number
WO 2011/011021 A1

(51) International Patent Classification:
A43B 13/38 (2006.01) *A43B 19/00* (2006.01)

(21) International Application Number:
PCT/US2009/053763

(22) International Filing Date:
13 August 2009 (13.08.2009)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
61/228,043 23 July 2009 (23.07.2009) US

(72) Inventor; and
(71) Applicant : KALDE, Harold [US/US]; 2309 Locust Street, St. Louis, MO 63119 (US).

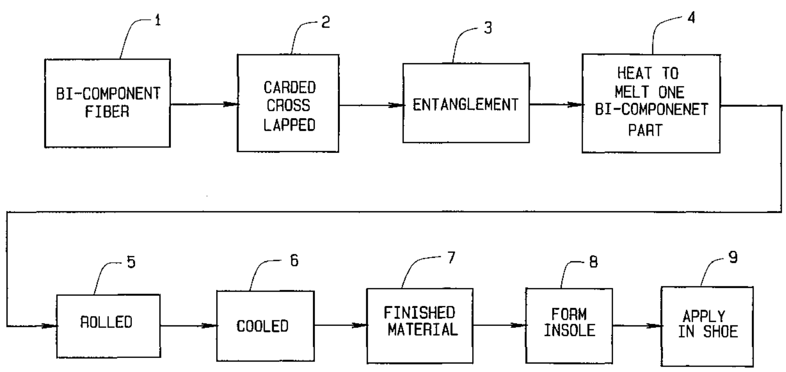
(74) Agent: LUCCHESI, Lionel, L.; Polster, Lieder, Woodruff & Lucchesi, L.C., 12412 Powerscourt Drive, Suite 200, St. Louis, MO 63131 (US).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, 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, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, 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, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*

(54) **Title**: BI-COMPONENT/BINDER FIBER INSOLE



(57) **Abstract**: A flexible shoe insole (8) is formed from essentially bi-component fiber (1) having a first low melting point for one component and a second higher melting point for a second component. The fiber is entangled (3) to form a fabric. The fabric thereafter is heated (4) to a temperature sufficient to melt the first component of the bi-component fiber (1) without causing permanent structural impairment of or to the second component, and the thickness of the fabric is reduced (5) to a pre-selected thickness.

WO 2011/011021 A1

TITLE:

BI-COMPONENT/BINDER FIBER INSOLE

CROSS-REFERENCE TO RELATED APPLICATIONS

This application derives and claims priority from United States patent application 61/228,043 filed July 23, 2009, incorporated herein by reference.

TECHNICAL FIELD

This invention relates to shoe insoles and in particular to the manufacture of a low cost shoe insole.

Numerous attempts have been made to provide a low cost insoles for shoes, and any number of allegedly low cost insoles have been suggested in the prior art. Among the lowest costs ones developed in the prior art are plastic extruded insoles which are utilized in a number of applications. Another widely used technique involves the use of non woven material which is saturated with a suitable binder and allowed to cure. As will be appreciated by those skilled in the art, nonwoven fabrics are commonly formed as a web or sheet of fibers bonded together by entangling fiber of filaments mechanically, thermally or chemically. In the shoe industry non-woven material has been used for insole manufacturing, but the procedure for its use generally is complicated. See for example, shoe insole and manufacturing method shown and described in United States Patent 4,603,442.

The invention described hereinafter provides an insole construction which preferably comprises approximately 100% of bi component fiber, i.e., a fiber which is manufactured with two components, one of which is a first polyester fiber, for example, having a relatively high melting point, which is coated with a second polyester fiber component, for example, having a relatively lower melting point. That s to say, a bi-component fibers conventionally are known in the art as extruding two polymers from the same spinneret with both polymers contained within the same filament. In particular, the process hereinafter is a simplified method of providing an insole at lower cost than previously available in the prior art. The bi-component fiber is layered in a convention way, and then preferably needle punched to form a fabric. The fabric is then heated to a temperature so that the lower temperature component of the bi-component filter fiber melts and the second component of the bi-component fiber is softened, which causes the fabric to form a cohesive mass. The fabric is then nipped between calendared rollers which compacts the material into a dense non woven mass having some preselected thickness. The material structure is still porous and can absorb water but because it is capable of compaction into a dense mass, it provides a material which makes an excellent insole material for shoes, for example, at substantially less cost then extruded plastic insoles having a similar material thickness.

One aspect of this disclosure is that insole thickness can be varied simply by altering the diameter of the bi component fiber while the weight of material of the nonwoven insole would remain the same. For example, a 24 oz. by weight insole material made with thinner bi-component fibers could pass through the rollers to compact the material down to some desired predetermined thickness, for example, .095 inches, while the same 24 oz. weight of the nonwoven made with thicker bi-component fibers would be compressed to .15 thousandths of an inch, for example. Those skilled in the art will recognize other material thickness and/or material weights maybe employed if desired.

SUMMARY OF THE INVENTION

In accordance with this disclosure, generally stated, a shoe insole is provided, preferably constructed preferably with approximately a 100% bi-component polyester fabric made from the bi-component fibers. The bi-component fiber, which in the preferred embodiment comprising of a two-part polyester having different melting points that is heated to a temperature which melts the lower melting component of the fiber but merely softens or relatively does not affect the higher temperature component of the fiber. The fibers are carded and cross lapped or layered in a convention manner and the resultant layered mass is then needle punched to form a non woven material. In accordance with the present disclosure, the material is heated to a temperature which melts the lower melting component of the fiber but merely softens or relatively does not affect the higher melt point temperature component. After heating, the material is calendared so that it compacts and becomes dense, and the melted component fuses the material structure into a cohesive mass. In another aspect of the disclosure, the weight of bi component fibers utilized for the fabric can remain relatively constant, while the thickness of the bi-component fibers is altered to provide a range of thickness for the compacted material while maintaining a generally similar weight of the compacted material per insole. In another aspect of the disclosure, the weight of the compacted material is increased while the thickness of the material remains constant, again by varying the thickness to the bi component fibers forming the material.

The foregoing and other objects, features, and advantages of the invention as well as presently preferred embodiments thereof will become more apparent from the reading of the following description in connection with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings which form part of the specification:

Figure 1 is a diagrammatic view of one illustrative embodiment for construction of the insole of the present invention.

Corresponding reference numerals indicate corresponding parts throughout the several figures of the drawings.

BEST MODE FOR CARRYING OUT THE INVENTION

The following detailed description illustrates the invention by way of example and not by way of limitation. The description clearly enables one skilled in the art to make and use the invention, describes several embodiments, adaptations, variations, alternatives, and uses of the invention, including what is presently believed to be the best mode of carrying out the invention.

Referring now to Figure 1, one illustrative method of producing the insole of the present invention is shown in diagrammatic form. As there shown, suitable polymer materials are extruded in the form of bi-component fibers as represented by the reference numeral 1. The fibers are introduced to a carding machine 2 to create a batt of material. The batt of material is then transferred in a conventional way to an entanglement station which entangles the fibers to create a nonwoven material. As will be apparent to those skilled in the art, entanglement can be accomplished in a number of ways, including high pressure water systems (sometimes referred to as spun-laced nonwovens), or in the preferred construction of the present invention by needle punching the batt with an oscillating needle to mechanically entangle the fibers. Other methods of fiber entanglement may be used, if desired. There after, the nonwoven is passed though a heat chamber 4. The chamber 4 preferably is a gas or electrically operated chamber furnace maintained at a predetermined temperature which is sufficient to melt one of the polymers of the bi-component fiber while not affecting the structural integrity of the other polymer of the bi-component fiber. Preferably, the chamber 4 operates at temperature of 300 to 350 degrees F. The operating temperature will depend upon the melting points of the bi-component fiber chosen initially, but ambient temperatures in shoe factories, for example will require the lower melting component of the fiber to have a melting point above the temperatures normally encountered in shoe manufacturing operations.

After heating, the material is passed through one or more rollers 5 to reduce the thickness of the material to some predetermined thickness. Insole material commonly has a thickness between .030 .and .160 inches which are achieved by compressing various thicknesses of nonwoven base weight material typically having a weight between 12 oz. and 35 oz. per square yard. It is a particular feature of the present disclosure that the finished product specifications can be obtained by varying the thickness of the bi-component fibers initially. Thus, employing a thicker fiber will produce a thicker final product assuming the rolling process is consistent in each instance.

After rolling, the material is allowed to cool at 6 and the finished mater 7 is formed into sheets or rolls which are then formed into insoles at 8 and applied in shoe manufacturing at 9.

As will be appreciated by those skilled in the art, preferred embodiment of the present disclosure uses substantially all bi-component fibers. The percentage of bi-component fibers can be altered, if desired. However, reducing the percentage or bi-component fiber below approximately thirty percent lessens the likely hood of obtaining suitable material for insole use without the addition of additional manufacturing procedures to insure proper binding of the fibers. Likewise, additional additives, for example color additives or other filler material may be used for particular purposes. For the purposes of this disclosure, the tem “substantially 100 percent” when applied to bi-component fibers means a percent of bi-component fibers sufficient to form suitable insole material without additional bonding manufacturing steps for the material other than entanglement, heating and roll forming the material.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results are obtained. As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

CLAIMS:

Claim 1. A flexible shoe insole consisting essentially of bi-component fiber having a first low melting point for one component and a second higher melting point for a second component, entangling the fibers to form a fabric, the fabric being heated to a temperature sufficient to melt the first component of the bi-component fiber without permanent structural impairment of the second component, and reducing the thickness of the fabric to a pre-selected thickness.

Claim 2. The insole of Claim 1 or the first component is a hot melt material.

Claim 3. The insole of Claim 2 wherein the second component is polyester fiber having a melting point of at least 400 degrees F.

Claim 4. The insole of Claim 1 wherein the thickness is reduced by passing the fabric through at least one set of rollers.

Claim 5. The insole of Claim 4 wherein one of the first and second components of the bi-component fiber has a color associated with it.

Claim 6. The insole of Claim 5 wherein the weight of the insole is constant but the thickness of the insole is variable.

Claim 7. The insole of Claim 6 wherein the thickness is controlled by the thickness of at least one of the first and second components of the bi-component fiber.

Claim 8. The insole of Claim 1 wherein the fibers are entangled by needle punching.

Claim 9. An insole for a shoe constructed by the steps of:

providing a bi-component fiber having a first low melting point component and a second high melting point component;

forming the fiber into a fabric;

heating the fabric sufficiently to melt the first component so as to bond the second component of the fabric;

passing the fabric through at least one set of rollers to reduce the material of the thickness of the fabric;

cooling the fabric;

forming at least one insole from the fabric.

Claim 10. The insole of clam 8 wherein the fibers are entangled by needle punching.

Claim 11. The insole of Claim 8 wherein at least one of the components of the bi-component fiber is polyester fiber having a melting point of at least 400 degrees F.

Claim 12. The insole of Claim 8 wherein the thickness is reduced by passing the fabric through at least one set of rollers.

Claim 13. The insole of Claim 8 wherein one of the first and second components of the bi-component fiber has a color associated with it.

Claim 14. The insole of Claim 8 wherein the weight of the insole is constant but the thickness of the insole is variable.

Claim 15. The insole of Claim 8 wherein the thickness is controlled by the thickness of at least one of the first and second components of the bi-component fiber.

Claim 16. A method of forming an insole comprising the steps of;

forming a fabric from essentially bi-component fiber, the fiber having a first low melting component and a second higher melting point component;

heating the fabric sufficiently to melt the first component so as to bond the second component of the fabric;

passing the material through at least one set of rollers to obtain a pre-determined thickness of the material.

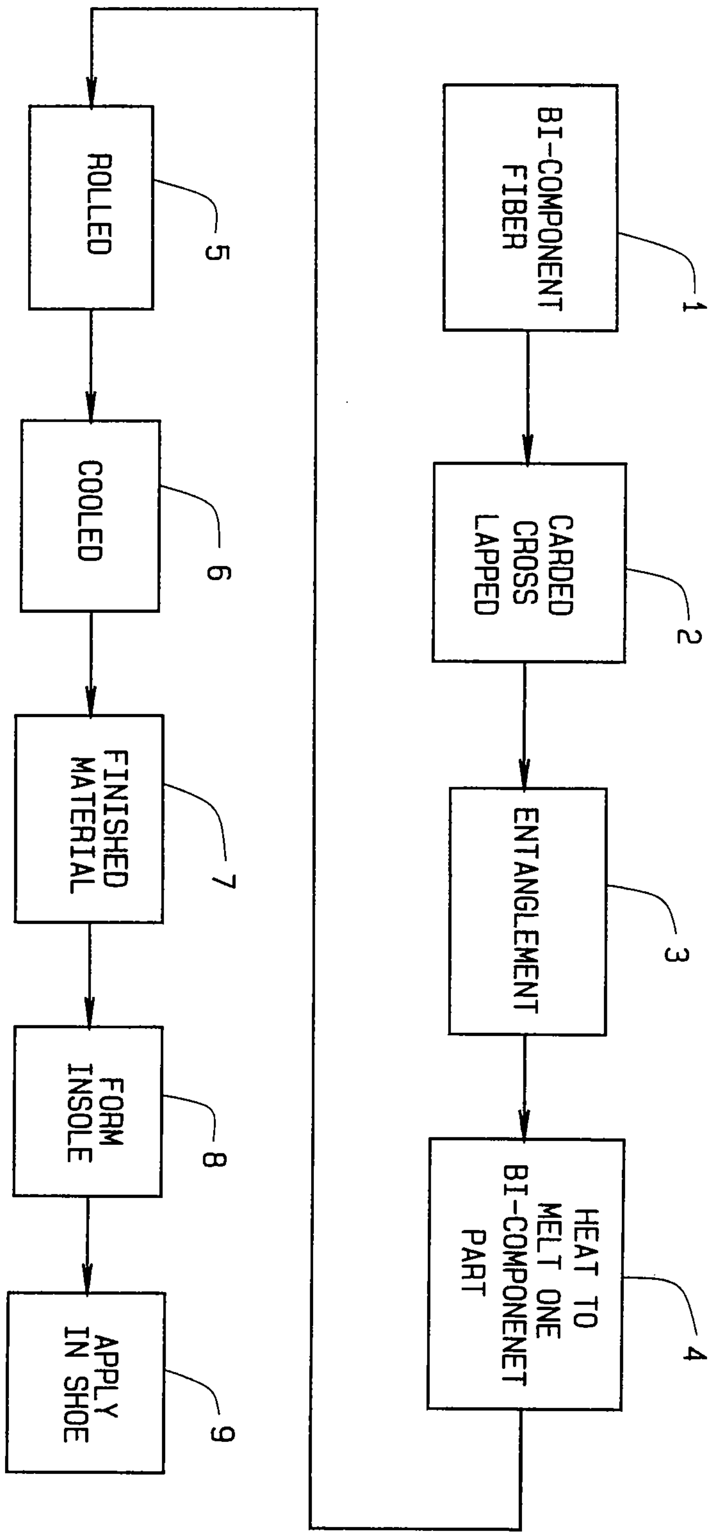
Claim 17. The method of Claim 15 wherein the fabric is constructed substantially of one hundred percent bi-component fibers

Claim 18. The method of Claim 15 wherein at least one of the components of the bi-component fiber is polyester fiber having a melting point of at least 400 degrees F.

Claim 19. The method of Claim 17 wherein the thickness of the material is controlled by the thickness of at least one of the first and second component of said bi-component fiber.

Claim 20. The method of Claim 18 wherein the bi-component fiber comprises first and second separate fiber strands.

Claim 21. The method of Claim 19 wherein the fibers are entangled by needle punching.


BI-COMPONENT FIBER
1
CARDED CROSS LAPPED
2
ENTANGLEMENT
3
HEAT TO MELT ONE BI-COMPONENET PART
4
ROLLED
5
COOLED
6
FINISHED MATERIAL
7
FORM INSOLE
8
APPLY IN SHOE
9

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 09/53763

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A43B 13/38; A43B 19/00 (2009.01)
USPC - 36/43
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)
IPC(8) - A43B 13/38; A43B 19/00 (2009.01)
USPC - 36/43

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
text search - see terms below

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PubWEST(USPT,PGPB,EPAB,JPAB); Espacenet; Google. Search terms: bicomponent, biconstituent, bonded, cylinder, entangle, fiber, fibre, gauge, insole, melt, multicomponent, multiconstituent, needle, roll, temperature, thick, thickness

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X --- Y	US 5,733,826 A (Groitzsch) 31 March 1998 (31.03.1998) Abstract, col 1 ln 51 to col 2 ln 8; col 2 ln 20-24; col 2 ln 66 to col 3 ln 3; col 4 ln 30-34	1-3, 8 ----- 4-7, 9-21
Y	US 2004/0253894 A1 (Fell et al.) 16 December 2004 (16.12.2004) fig 2; para [0085], [0141]	4-7, 9-21
Y	US 5,382,400 A (Pike et al.) 17 January 1995 (17.01.1995) Abstract; col 3 ln 27-50; col 4 ln 25-28.	17
A	US 2004/0122396 A1 (Maldonado et al.) 24 June 2004 (24.06.2004)	1-21
A	US 4,999,237 A (Mellors et al.) 12 March 1991 (12.03.1991)	1-21
A	US 6,555,490 B1 (Wildbore et al.) 29 April 2003 (29.04.2003)	1-21
A	US 2007/0212967 A1 (Grynaeus et al.) 13 September 2007 (13.09.2007)	1-21

☐ Further documents are listed in the continuation of Box C. ☐

* 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	Date of mailing of the international search report
21 September 2009 (21.09.2009)	28 SEP 2009

Name and mailing address of the ISA/US	Authorized officer:
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774