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— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

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— *with international search report*

(54) **Title:** RECYCLED BICYCLE TIRE FOXING TAPE FOR FOOTWEAR AND METHOD OF MAKING FOOTWEAR

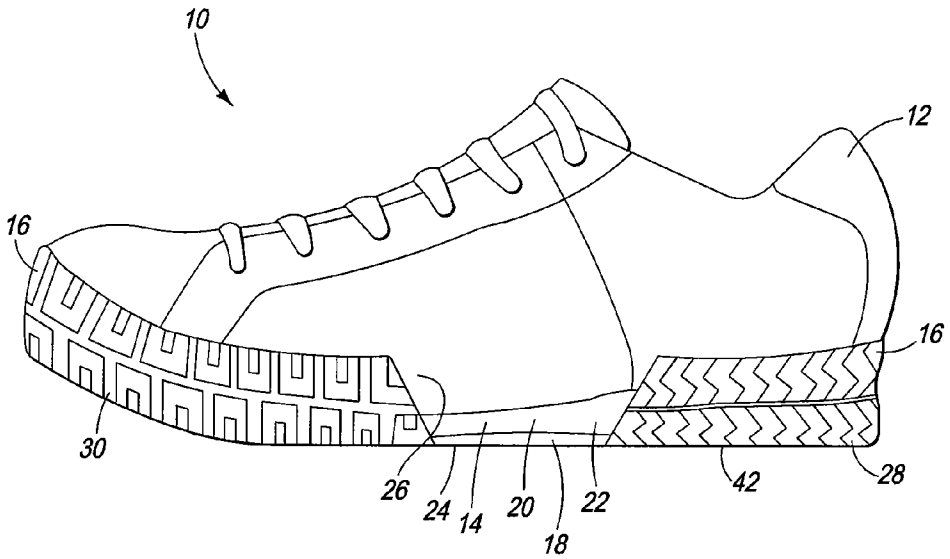

FIG. 1

(57) **Abstract:** A method of manufacturing and article of footwear from a reclaimed bicycle tire includes the steps of providing an article of footwear having an upper attached to a sole, providing a worn bicycle tire, cutting a strip from the tire, and attaching the strip to at least a portion of a peripheral surface of the sole as foxing tape.

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RECYCLED BICYCLE TIRE FOXING TAPE FOR FOOTWEAR AND METHOD OF MAKING FOOTWEAR

RELATED APPLICATION(S)

The present application claims priority from U.S. Serial No. 11/811,028 filed June 8, 2007.

FIELD OF THE INVENTION

This invention relates generally to footwear, and particularly to an article of footwear having bicycle tire material used as foxing tape, and a method of making same.

BACKGROUND OF THE INVENTION

The conventional manufacture of footwear results in significant amounts of synthetic waste products. Further, footwear components, such as outsoles and foxing tape, are typically formed of plastic and/or rubber materials. These materials are conventionally made from limited or non-renewable resources, which results in a negative environmental impact.

SUMMARY OF THE INVENTION

A method of manufacturing an article of footwear includes the steps of providing an upper attached to a sole, providing a tire, and cutting a

strip from the tire. The method further includes the step of attaching the strip to at least a portion of a peripheral surface of the sole as foxing tape.

An article of footwear includes a sole having a peripheral surface and foxing tape. The foxing tape comprises a portion of a tire that is attached to the peripheral surface of the sole.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of a lateral side of an article of footwear of the present invention;

FIG. 2 is a side perspective view of a bicycle tire;

FIG. 3 is a front perspective view of a strip of the tire;

FIG. 4 is a plan view of the strip of tire flattened;

FIG. 5 is a plan view of a strip of foxing tape;

FIG. 6 is an elevational view of a lateral side of an alternate embodiment of footwear of the present invention;

FIG. 7 is a plan view of an alternate strip of foxing tape; and

FIG. 8 is a process flowchart of the method of making the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIG. 1 of the drawings, an article of footwear 10 is constructed in accordance with one embodiment of the invention. Specifically, the footwear 10 includes an upper 12, a sole 14 and foxing tape 16

made from recycled bicycle tires. Preferably, the sole 14 includes multiple layers, for example an outsole 18, a midsole 20 and an insole layer (not shown).

The foxing tape 16 is attached to a portion of a peripheral surface 22 of the sole 14 and generally extends from a lower edge 24 of the outsole 18, onto the upper 12, covering the sole and a lower portion 26 of the upper. The foxing tape 16 is disposed on the peripheral surface 22 at a heel region 28 and a forefoot region 30, however it is contemplated that the foxing tape 16 can extend the full periphery of the footwear, or can be disposed at another location on the article of footwear 10 suited for foxing. When assembled, the foxing tape 16 provides a protective cover, wear surface, and/or a decorative feature of the article of footwear 10.

The method for manufacturing the article of footwear 10 in accordance with the invention includes obtaining a tire 32, preferably a bicycle tire, and more preferably a used bicycle tire (FIG. 8, step 1). Used bicycle tires can be obtained in bulk from bicycle stores. Bicycle tires that have no splits or severe physical damage in the material are selected for use as foxing (FIG. 8, step 2). A tire 32 with a worn, low-relief tread is preferred because it is easier to work with, requires less processing, and is aesthetically desirable. Further, a tire 32 that is pliable and has a smooth inside surface is preferred. The tire 32 is cleaned with water to remove any contaminants from the surface (FIG. 8, step 3).

Referring to FIGs. 2-3, the tire 32 is generally circular and has a generally "U"-shaped cross-section. A tire bead portion 33 of each sidewall 36 is cut off of the tire 32 (FIG. 8, step 4). The tire 32 is also cut radially to form a strip 34 of tire 32 of a predetermined length (FIG. 3, FIG. 8, step 5). It is contemplated that the tire bead portion 33 can be cut off the tire 32 either before or after forming the strip 34.

Referring now to FIGs. 4 and 5, the strip 34 is flattened (FIG. 8, step 6) and is cut longitudinally, either manually or with automated machinery, to separate the sidewalls 36 from the tread portion 38 (FIG. 8, step 9). The tread portion 38 is generally straight and flat compared to the relatively rounded sidewalls 36, which makes the tread portion easier to cut or otherwise manipulate. In the preferred embodiment, the tread portion 38 forms the foxing tape 16. Individual pieces of foxing tape 16 can be cut to have desired length and width dimensions for application to the article of footwear 10, for example by using a template or reference lines (FIG. 5). In the preferred embodiment, the foxing tape 16 is cut to have about a 3-cm width.

In assembling the foxing tape 16 to the article of footwear 10, the sole 14 is attached to the upper 12, by any conventional means, such as by stitching or gluing them together. Subsequently, the foxing tape 16 is attached to the sole 14 and the upper 12 as described below.

The inner surface 40 of the foxing tape is ground to remove any inner textile casing or other unwanted debris, and to roughen the inner surface of the tire to improve bonding to the sole 14 and the upper 12 (FIG. 8, step 8).

Preferably, a conventional high speed wheel grinder is used to grind the inner surface 40. Preferably, the cleaning and roughening processes occur after cutting the foxing tape 16 to the desired length and width dimensions, however, the cleaning and roughening steps can also occur before cutting the foxing tape. Alternately, the surface of the upper 12 and/or the inner surface 40 of the foxing tape 16 can be chemically treated, heat treated or otherwise modified so that the surface characteristics of the upper and/or the foxing tape can provide the desired bonding between the materials.

A primer, such as a conventional solvent based primer, is applied to the inner surface 40 of the foxing tape 16 (FIG. 8, step 9). Cement is applied to the lower portion 26 of the upper 12 and the peripheral surface 22 of the sole 14 (FIG. 8, step 10). The primer and the solvent can be applied by an automated device or manually, such as with a sponge or a brush. Then, ultra-violet light or heat is applied to the inner surface 40 of the foxing tape 16 and the upper 12 and the sole 14 to activate the primer and cement (FIG. 8, step 11). Alternatively, and more preferably, non-toxic water based adhesive systems can be used.

After the ultra-violet light treatment, the pre-cut piece or strip 34 of foxing tape 16 is positioned around the peripheral surface 22 of the sole 14 so that an inner surface 40 (see FIG. 3) of the foxing tape 16 contacts the sole. The foxing tape 16 is pressed against the upper 12 and the sole 14 to adhere it to the article of footwear 10 (FIG. 8, step 12). It is contemplated that the application of the foxing tape 16 can be done mechanically or manually.

Preferably, a roller is used to press the foxing tape 16 against the article of footwear 10.

After the foxing tape 16 is attached to the article of footwear 10, any portions protruding from the sole 14 can be trimmed so that a bottom edge 42 of the foxing tape is flush with the lower surface 24 of the outsole 18 (FIG. 8, step 13).

The article of footwear 10 with applied foxing tape 16 is then preferably placed into a pressing mold where the foxing tape is uniformly pressed against the upper 12 and the sole 14 (FIG. 8, step 14). Preferably after pressing it in the pressing mold, heat is applied to the article of footwear 10 in a heat tunnel to cure the cement (FIG. 8, step 15).

Surface blemishes or burrs on the foxing tape 16 are buffed smooth (FIG. 8, step 16), and any excess cement and/or primer are cleaned off of the article of footwear 10 (FIG. 8, step 17). Water is used to wash the sole 14 and the foxing tape 16.

Other components can be added to the article of footwear 10 before, during or more preferably after the foxing tape 16 is attached to the article of footwear. For example, a sockliner and laces can be inserted into the article of footwear after the foxing tape 16 is attached (FIG. 8, step 18).

In an alternate embodiment of an article of footwear 110 shown in FIG. 6, the foxing tape 116 includes a tread portion 138 and a portion of the bicycle tire sidewall 136. Referring to FIGs. 6 and 7, the tire is cut to separate an upper portion of the sidewalls from a lower portion of the sidewalls 136 and

the tread portion 138. The remaining lower portion of the sidewalls 136 and the tread portion 138 together form the foxing tape 116. In the preferred embodiment, the foxing tape 116 is cut to have a 3-cm width, with the tread portion 138 being about 2-cm in width and the lower portion of the sidewall 136 being about 1-cm in width. The foxing tape 116 is attached to the article of footwear 110 in generally the same way as the first embodiment, but with the tread portion 138 generally coextending with the peripheral surface 122 of the sole 114 and the sidewall 136 generally coextending with a lower portion 126 of the upper 112.

While the preferred embodiments of the present invention have been shown and described, it is to be understood that these are merely examples for practicing the invention that the inventor foresees at the present time, and that various modifications and changes could be made thereto.

What is claimed is:

1. A method of manufacturing an article of footwear comprising:

providing an upper attached to a sole;

providing a worn tire;

cutting a strip from said tire; and

attaching said strip to at least a portion of a peripheral surface of said sole as foxing tape.

2. The method of claim 1 wherein said tire comprises a tread portion and a sidewall portion, wherein said cutting step comprises cutting said strip from said tire to include at least a portion of said tread portion.

3. The method of claim 2 wherein said cutting step comprises cutting said strip from said tire to include at least a portion of said tread portion and said sidewall.

4. The method of claim 1 further comprising the step of grinding an inner surface of said strip prior to attaching said strip to said sole.

5. The method of claim 1 wherein said attaching step comprises:

applying a primer to an inner surface of said strip;

applying cement to said upper and said sole;

activating the primer and cement with ultra-violet light; and

applying said strip to said upper and said sole to adhere it to the article of footwear.

6. The method of claim 1 wherein said tire is a reclaimed bicycle tire.

7. The method of claim 1 further comprising the step of pressing said strip against said sole and said upper.

8. An article of footwear comprising a sole having a peripheral surface and foxing tape comprising a portion of a recycled tire that is attached to said peripheral surface of said sole.

9. The article of footwear of claim 8 wherein said foxing tape comprises a tread portion of said tire.

10. The article of footwear of claim 8 wherein said foxing tape comprises a tread portion and a sidewall portion of said tire.

11. The article of footwear of claim 10 further comprising an upper attached to said sole, wherein said tread portion generally coextends with said peripheral surface of said sole and said sidewall portion generally coextends with a lower portion of said upper.

12. The article of footwear of claim 8 further comprising a forefoot region and a heel region, wherein a first foxing tape extends around said forefoot region and a second foxing tape extends around said heel region.

13. A method of manufacturing an article of footwear comprising:

providing an upper attached to a sole;

selecting a worn bicycle tire;

cleaning the tire;

radially cutting a strip from the tire;

trimming the strip longitudinally to include at least a portion of a tread portion of the tire;

grinding an inner surface of the strip to remove unwanted material and to roughen the inner surface; and

cementing the strip to at least a portion of a peripheral surface of the footwear to cover said sole and a portion of said upper.

14. A method of recycling used bicycle tires for use in footwear, comprising:

obtaining a supply of worn or damaged bicycle tires,

selecting tires that have no splits or severe physical damage and having a worn tread,

cleaning the selected bicycle tires,

cutting the selected tires to form foxing tapes, and

cementing the foxing tapes onto articles of footwear.

15. A method as set forth in claim 14, further comprising the step of grinding an inner surface of the foxing tape prior to the cementing step to remove any inner textile casing or debris, and to roughen the surface to improve bonding.

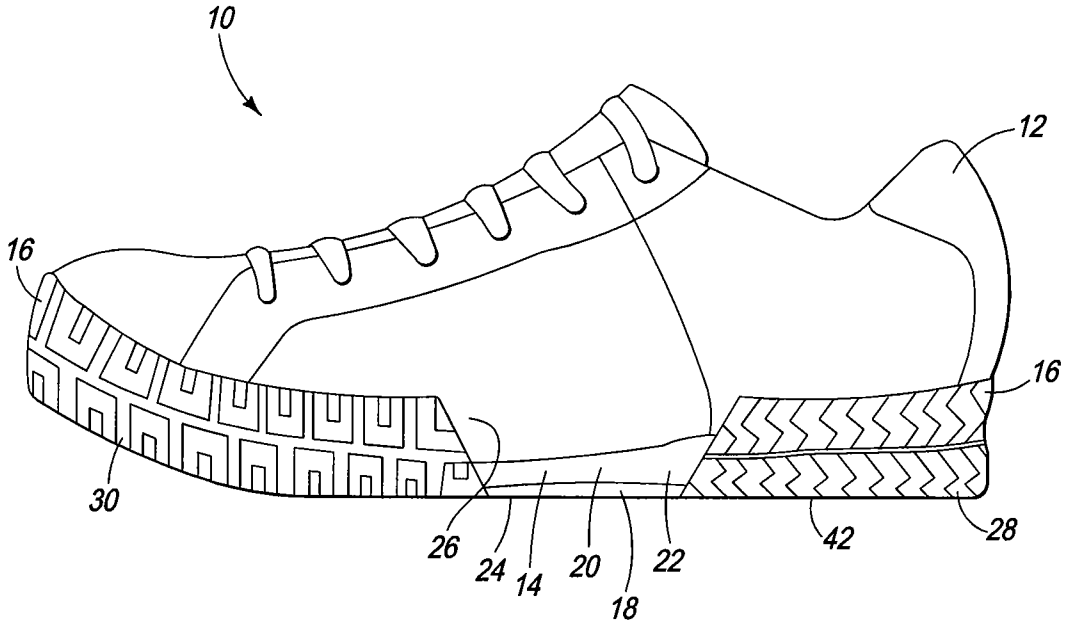

FIG. 1

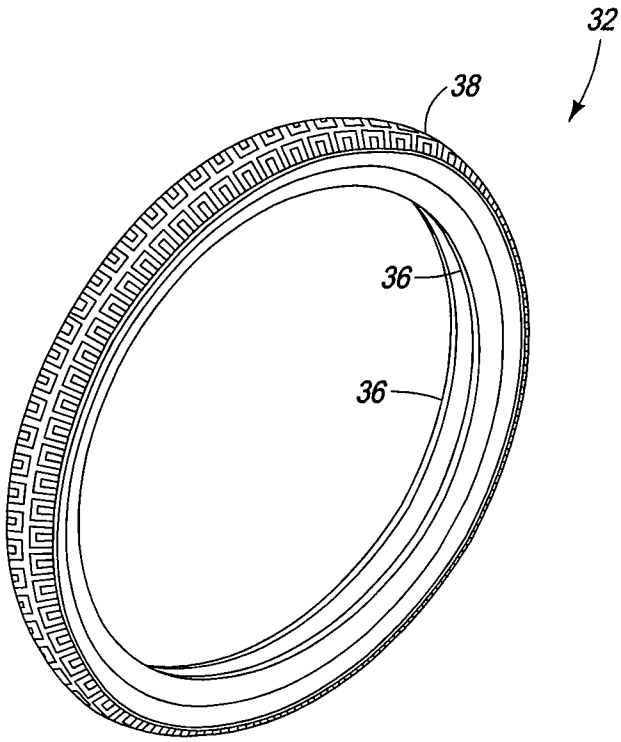

FIG. 2

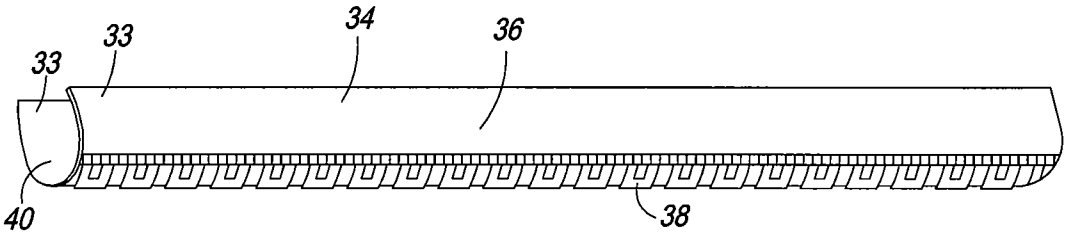

FIG. 3

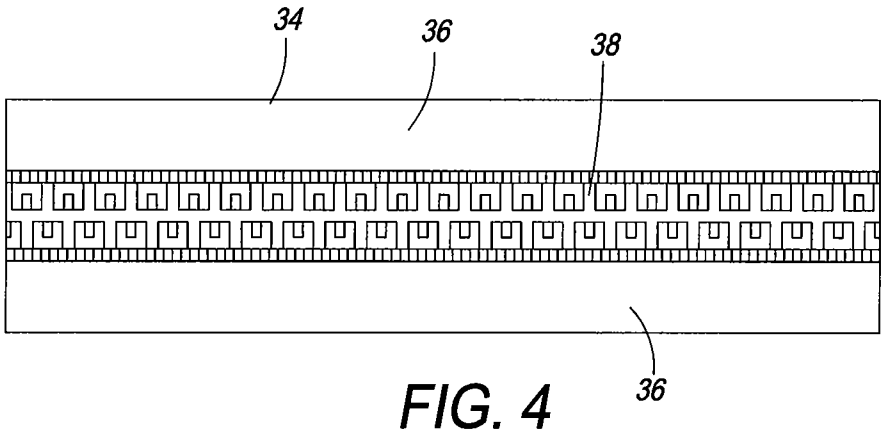

FIG. 4

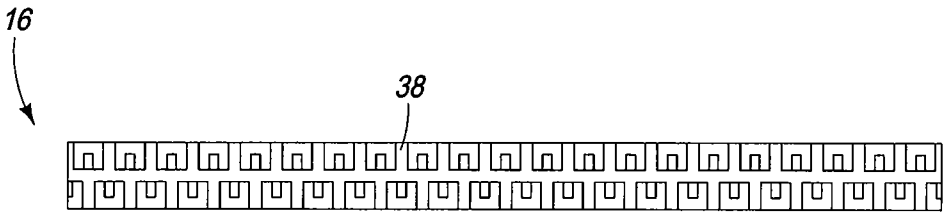

FIG. 5

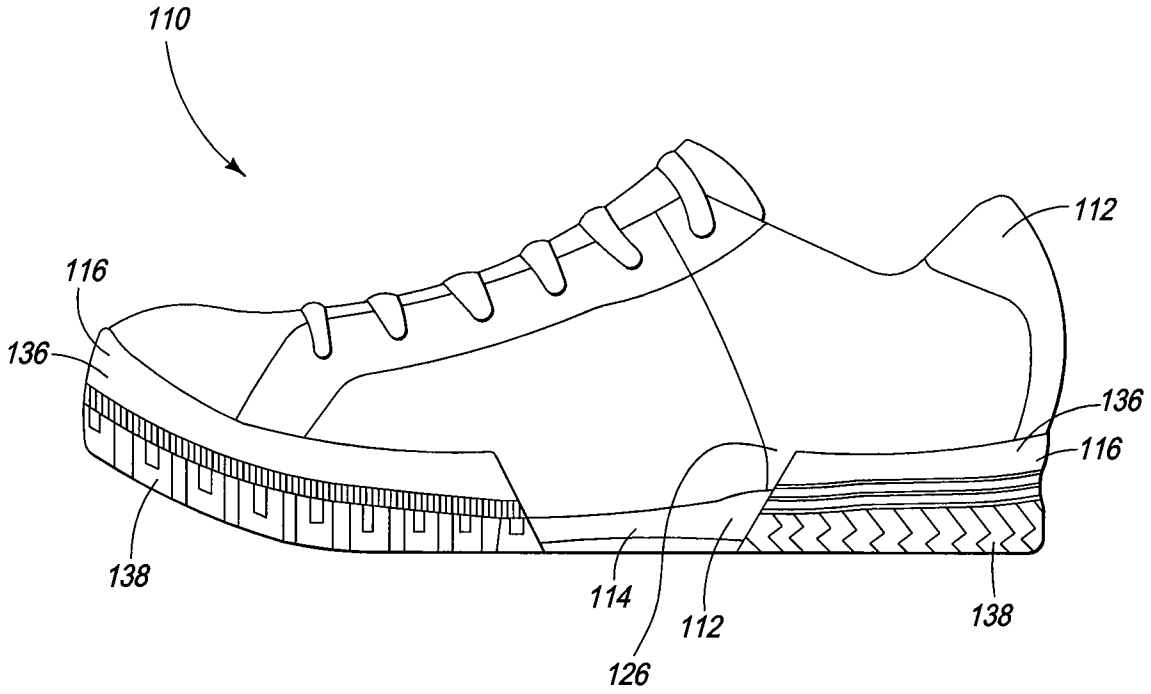

FIG. 6

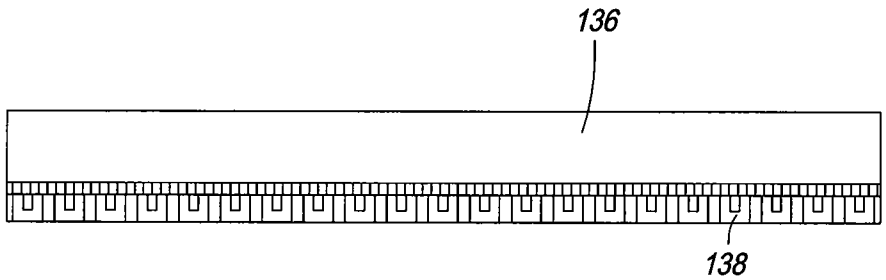

FIG. 7

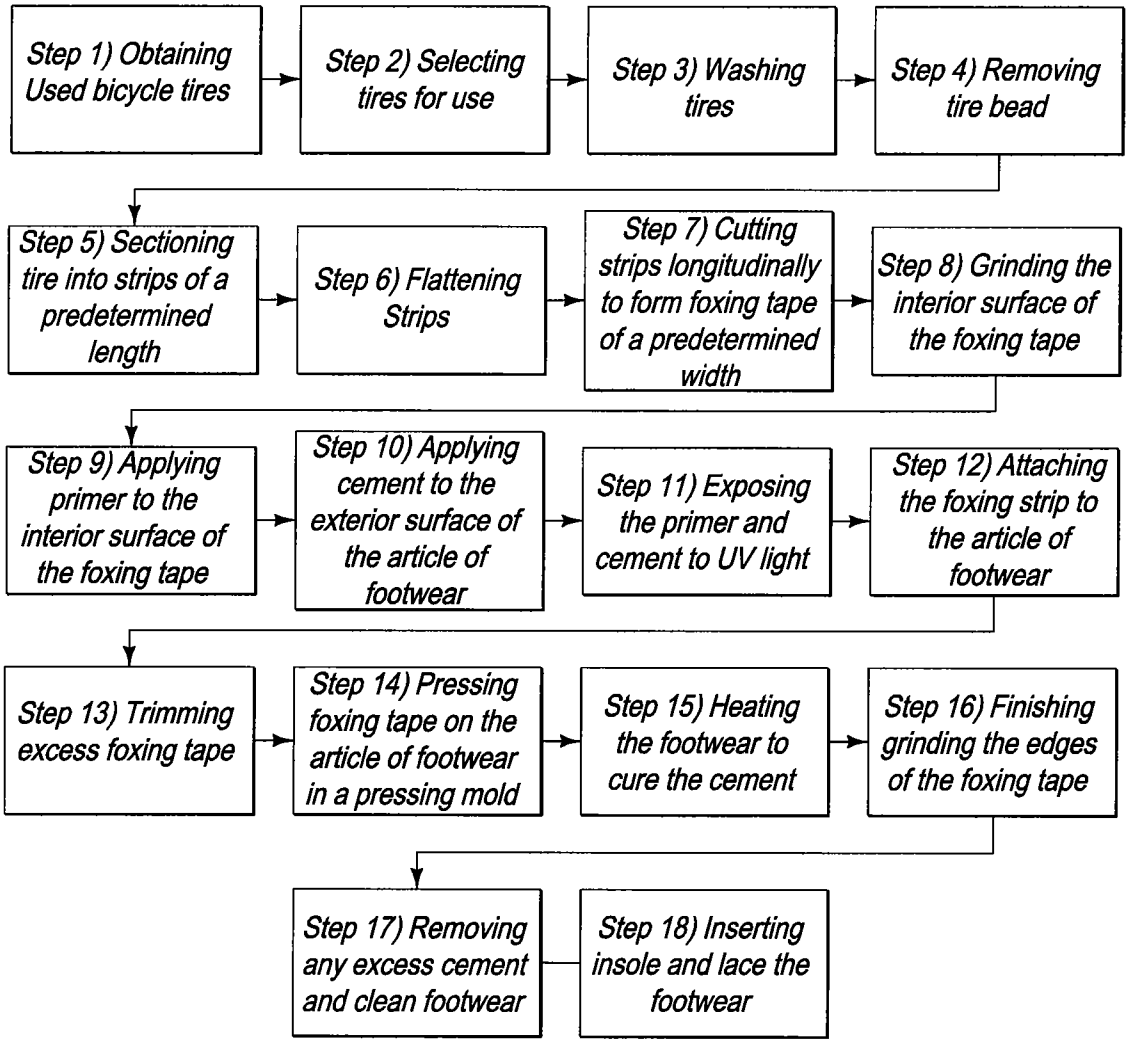
Step 1) Obtaining Used bicycle tires
Step 2) Selecting tires for use
Step 3) Washing tires
Step 4) Removing tire bead
Step 5) Sectioning tire into strips of a predetermined length
Step 6) Flattening Strips
Step 7) Cutting strips longitudinally to form foxing tape of a predetermined width
Step 8) Grinding the interior surface of the foxing tape
Step 9) Applying primer to the interior surface of the foxing tape
Step 10) Applying cement to the exterior surface of the article of footwear
Step 11) Exposing the primer and cement to UV light
Step 12) Attaching the foxing strip to the article of footwear
Step 13) Trimming excess foxing tape
Step 14) Pressing foxing tape on the article of footwear in a pressing mold
Step 15) Heating the footwear to cure the cement
Step 16) Finishing grinding the edges of the foxing tape
Step 17) Removing any excess cement and clean footwear
Step 18) Inserting insole and lace the footwear

FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 08/65932

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - A43B 13/04 (2008.04)
USPC - 36/32A
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 13/04 (2008.04)
USPC: 36/32A

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 36/25R, 32R - generally all classes as limited by search 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); Google Scholar; Google; Google Patents
Search Terms Used: foxing tape, foxing strip, tire, adhesive, sole, upper, shoe, recycled, bicycle, rubber, cement, glue, bonding, ultra-violet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,026,044 A (Senter) 31 May 1977 (31.05.1977); fig 1,3; col 1 ln 39-40, col 2 ln 9-68	1-15
Y	VEST, H., Recycling of Used Car Tyres, Gate - Technical Information W13e, 2000, pg.4-5	1-15
Y	US 5,203,793 A (Lyden) 20 April 1993 (20.04.1993); col 15, ln 12-14	5

☐ 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
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"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
15 September 2008 (15.09.2008)	22 SEP 2008
Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US, Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	Authorized officer: Lee W. Young PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

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