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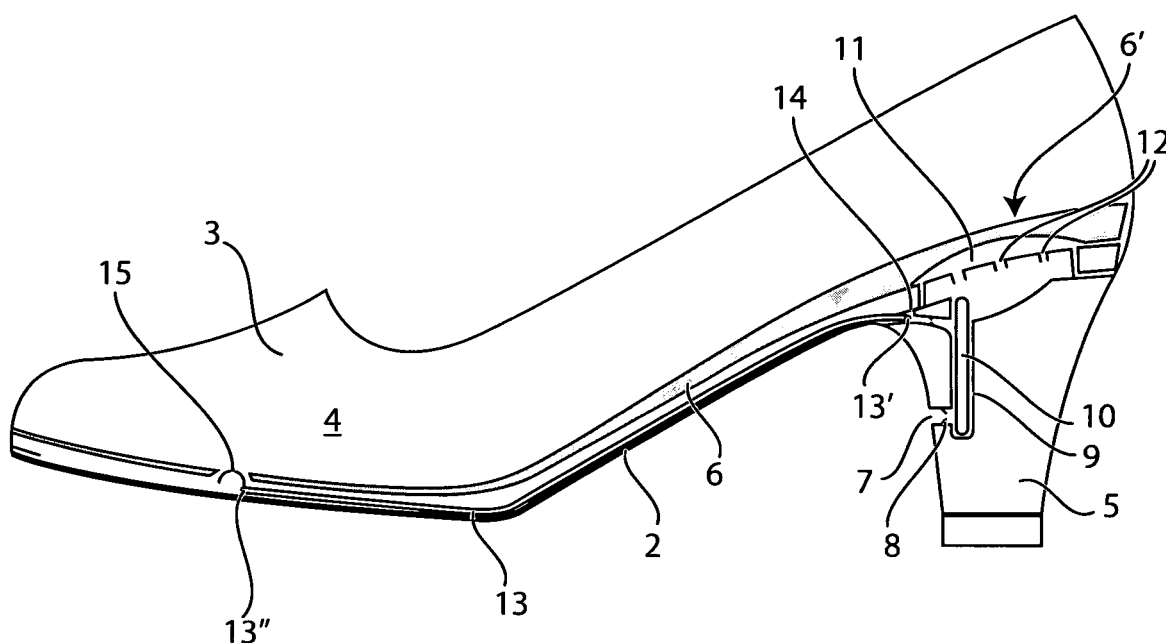
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(54) **Forced ventilation footwear**

(57) The present innovation relates to forced ventilation (1) footwear comprising an outsole (2); an insole (6); at least one air inlet opening (7) formed in the exterior surface of said shoe (1); at least one air outlet opening (15) formed in said insole (6) to permit the delivery of air into said footwear (1); and pumping means (6', 8, 11, 14) communicating with said at least one inlet opening (7) and said at least one outlet opening (15), and which may be actuated by the compression of a wearer's foot on

said insole (6) during use so as to activate the passage of a flow of air from said at least one inlet opening (7), and direct said flow of air to the inside of said shoe (1) through said at least one outlet opening (15); said shoe (1) being characterised in that it further comprises a housing (9) disposed along the path of said flow of air, through which said flow of air is forced to pass during the pumping action of said pumping means (6', 8, 11, 14); and air treatment means (10) removably installed in said housing (9).



Description

[0001] The present invention relates to forced ventilation footwear.

[0002] More specifically, the invention relates to an item of footwear, such as a shoe, boot or the like, which can ventilate the wearer's foot during walking and simultaneously deodorise and sterilise the environment inside the footwear itself.

[0003] As is well known, after a person spends an entire day wearing closed items of footwear such as shoes, boots or the like, he or she will experience the familiar sensation of swollen, tired feet, along with the annoyance of the unpleasant odour emanating from said footwear as a consequence of prolonged perspiration of the feet.

[0004] To date different systems have been introduced to prevent feet from sweating excessively during a day in which footwear is worn for a prolonged period.

[0005] Among the above-mentioned systems we may consider patent application no. WO 2007/010583 A1, wherein is described an improved footwear structure provided with a sole comprising a box-type container, in which a material capable of absorbing moisture is present, and which communicates with a receptacle for collecting moisture. The system also comprises means for pumping moist air out of the inside of the footwear in order to dehumidify it.

[0006] The improved footwear structure according to the known art may serve to attenuate the problem of foot perspiration but does not solve it completely. With the above-described system, in fact, feet generally remain damp due to the moisture absorbed by the upper and sole of the footwear.

[0007] It is well known, moreover, that the unpleasant odour is generally caused by the proliferation of bacteria in the moist environment created by the natural perspiration of feet; these bacteria are capable of thriving in the porosities of the natural materials from which the upper and sole are manufactured (leather, fabric, etc.), further undermining the effectiveness of any system based solely on the dehumidification of air inside the footwear.

[0008] A partial solution to the above-described technical problem is provided by another type of footwear known in the art, equipped with a system for pumping outside air into the inside of the footwear itself, as described in the U.S. patent application no. US 2006/0143943 A1 or patent application no. US 6,370,799 B1.

[0009] Specifically, the aforesaid patent application relates to a shoe provided with a ventilation and shock absorber device which, by means of a pump actuated by the movement of the wearer as he or she walks, forces the introduction of air into the shoe, after the passage thereof through an air chamber provided with functional means designed to emit infrared radiation and comprising, among other components, a deodorant or similar substances.

[0010] The technical drawback of the above-described

solutions is that they entail a rather complex structural configuration and hence an obvious increase in production costs.

[0011] Furthermore, the air treatment substances provided lose effectiveness after a short time.

[0012] In light of the above considerations, it is an object of the present invention to propose a forced ventilation system whereby a flow of air is directed to the inside of the footwear to permit treatment thereof, making it possible to maintain a high level of sterilisation and deodorisation of the footwear itself, with a high degree of effectiveness over time.

[0013] The present invention thus specifically relates to forced ventilation footwear comprising an outsole; an insole; at least one air inlet opening formed in the exterior surface of said footwear; at least one air outlet opening formed in said insole to permit the delivery of air into said footwear; and pumping means communicating with said at least one inlet opening and said at least one outlet opening, and which may be activated by the compression of a wearer's foot on said insole during use, so as to activate the passage of a flow of air from said at least one inlet opening, and direct said flow of air to the inside of said footwear through said at least one outlet opening; said footwear being characterised in that it further comprises a housing disposed along the path of said flow of air, through which said flow of air is forced to pass during the pumping action of said pumping means; and air treatment means removably installed in said housing.

[0014] Again according to the invention, said air treatment means may include a fragrance and/or bactericidal or antimicrobial substances.

[0015] Further according to the invention, said air treatment means can consist in a solid body.

[0016] Additionally according to the invention, said pumping means may comprise an air chamber delimited at least in part by a portion of said insole; a first one-way valve, situated on said inlet opening, configured to prevent the backflow of air from said air chamber to said at least one inlet opening; and a second one-way valve, placed between said air chamber and said at least one outlet opening, configured to prevent the backflow of air from said outlet opening to said air chamber.

[0017] Advantageously, according to the invention, said footwear may comprise a conduit having a first extremity connected to said air chamber and a second extremity connected to said at least one air outlet opening.

[0018] Again according to the invention, said second one-way valve may be applied on said first extremity of said conduit.

[0019] Further according to the invention, said housing may be situated in the heel.

[0020] Additionally according to the invention, said at least one air outlet opening may be fashioned in the front part of the footwear.

[0021] The present invention shall now be described for illustrative, non-restrictive purposes, according to the preferred embodiment thereof, with particular reference

to the appended drawing, which shows a side cross-section view of an item of women's footwear with forced ventilation according to the present invention.

[0022] Referring to the appended drawing, one may observe a cross-section view of the forced ventilation footwear, denoted by the numerical reference 1, according to the present invention, and which in the case in question is a woman's shoe.

[0023] The footwear 1 comprises an outsole 2 coupled to an upper 3. Between said outsole 2 and said upper 3 a space 4 is defined in which a wearer may place her foot.

[0024] The footwear 1 further comprises a heel 5 and insole 6.

[0025] On the heel 5 there is an opening 7, on which a first one-way valve 8 is applied.

[0026] In the present embodiment, on the inside of the heel 5 there is also a housing 9 in which a solid body 10 has been inserted for air treatment purposes.

[0027] Said body 10 comprises substances for treating air, such as fragrance and/or bactericidal and/or antimicrobial substances, whereby it is capable of enriching the air entering into contact with it so that the air itself becomes deodorised and sterilised.

[0028] Furthermore, said body 10 is removable. Therefore, when the fragrance of the body 10 is depleted or the bactericidal effects thereof are no longer effective, said body 10 can be replaced with a new equivalent one, thus maintaining intact the effectiveness of the invention over time.

[0029] Said footwear 1 also has an air chamber 11 superiorly delimited by a portion 6' of said insole 6. The air chamber 11 communicates with said housing 9 and said opening 7 via a plurality of holes 12.

[0030] Said footwear 1 further comprises a conduit 13 having a first extremity 13' connected to said air chamber 11. Said first extremity 13' is fitted with a second one-way valve 14, whereas at the second extremity 13" of the conduit 13 there is an air outlet opening 15 formed in said insole 6.

[0031] The forced ventilation of said footwear 1 is achieved in the following manner.

[0032] When the footwear 1 is worn, the heel of the wearer's foot (not shown in the figure) can rest upon said insole 6 in the portion 6' overlying the air chamber 11.

[0033] As the user walks, after the foot is lifted the air chamber 11 expands and air is forced into the chamber itself due to the effect of the suction pressure created.

[0034] The air enters said opening 7, passing through said first one-way valve 8. Moreover, before reaching the air chamber 11 through the holes 12, the air passes through said housing 9 and said body 10, which releases fragrance into the air and enriches it with said bactericidal and antimicrobial substances.

[0035] As the action of walking continues, the wearer rests her heel on the portion 6' of the insole 6 and the resulting shifting of weight causes the air chamber 11 to be compressed. The air contained in the air chamber 11 is thus forced to flow into the conduit 13 through said

second one-way valve 14, thus reaching said outlet opening 15 and entering inside the footwear 1, while said first valve 8 prevents it from flowing back out through said first opening 7.

5 [0036] The air that enters the footwear 1 is thus not only clean, since it comes from the outside, but has also been treated with fragrance and sterilised.

[0037] The footwear 1 can be provided with a plurality of conduits and outlet openings through which air can be forced to flow inside the footwear 1.

10 [0038] On the basis of the previous description, it may be observed that the fundamental characteristic of the present invention is that it allows the possibility of replacing the air treatment body, thereby assuring the capability of the footwear to maintain a high level of foot hygiene.

15 [0039] The present invention has been described for illustrative, non-restrictive purposes, according to the preferred embodiments thereof, but changes and/or modifications can be made thereto by experts in the art without departing from the scope of protection, as defined by the appended claims.

Claims

- 25 1. Forced ventilation footwear (1) comprising
 - an outsole (2);
 - an insole (6);
 - at least one air inlet opening (7) formed in the exterior surface of said footwear (1);
 - at least one air outlet opening (15) formed in said insole (6) to permit the delivery of air into said footwear (1); and
 - 30 pumping means (6', 8, 11, 14) communicating with said at least one inlet opening (7) and said at least one outlet opening (15), and which may be actuated by the compression of a wearer's foot on said insole (6) during use, so as to activate the passage of a flow of air from said at least one inlet opening (7) and direct said flow of air to the inside of said footwear (1) through said at least one outlet opening (15); said footwear (1) being **characterised in that** it further comprises
 - 35 a housing (9) disposed along the path of said flow of air, through which said flow of air is forced to pass during the pumping action of said pumping means (6', 8, 11, 14); and
 - air treatment means (10) removably installed in said housing (9).
- 40 2. Footwear (1) according to claim 1, **characterised in that** said air treatment means (10) comprises fragrance.
- 45 3. Footwear (1) according to any of the previous claims, **characterised in that** said air treatment means (10) comprises bactericidal or antimicrobial substances.
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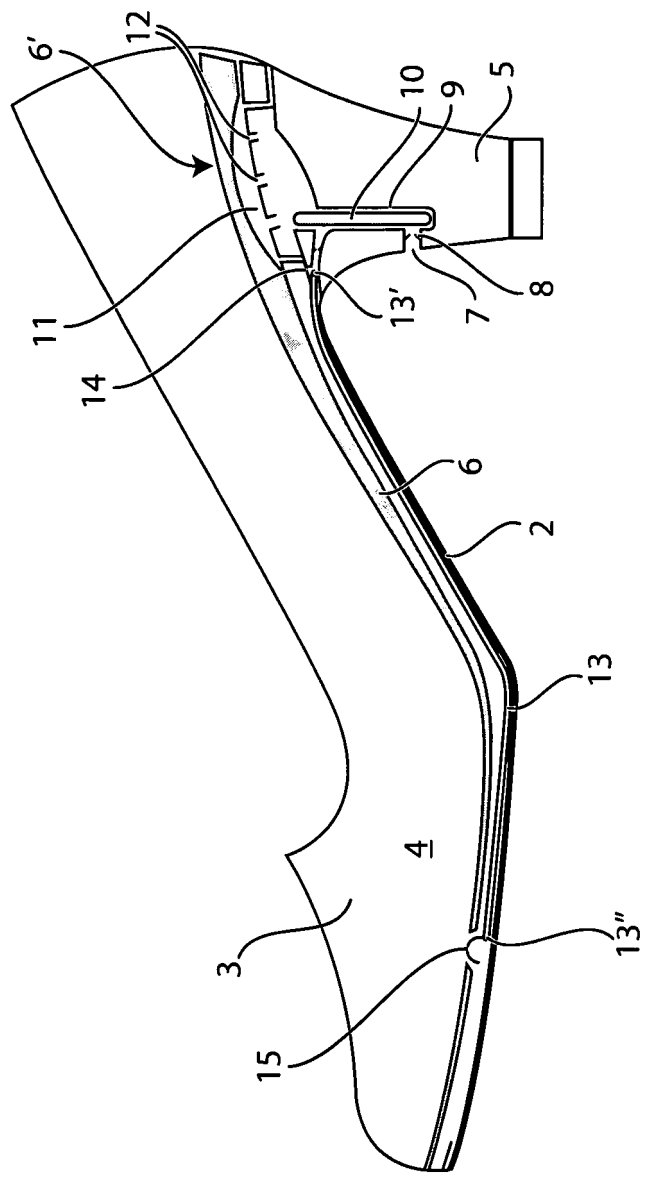
4. Footwear (1) according to any of the previous claims, **characterised in that** said air treatment means is comprised of a solid body (10).
5. Footwear (1) according to any of the previous claims, **characterised in that** said pumping means comprises
an air chamber (11) delimited at least partially by a portion (6') of said insole (6);
a first one-way valve (8) situated on said inlet opening (7), configured to prevent the backflow of air from said air chamber (11) to said at least one inlet opening (7); and
a second one-way valve (14), placed between said air chamber (11) and said at least one outlet opening (15), configured to prevent the backflow of air from said outlet opening (15) to said air chamber (11).
6. Footwear (1) according to claim 5, **characterised in that** it comprises a conduit (13) having a first extremity (13') connected to said air chamber (11) and a second extremity (13'') connected to said air outlet opening (15).
7. Footwear (1) according to claim 6, **characterised in that** said second one-way valve (14) is applied on said first extremity (13') of said conduit (13).
8. Footwear (1) according to any of the previous claims, **characterised in that** said housing (9) is situated in the heel (5).
9. Footwear (1) according to any of the previous claims, **characterised in that** said at least one air outlet opening (15) is formed in the front part of the footwear (1).

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European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 08 42 5344

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2004/221481 A1 (REGEN PAUL LEWIS [US]) 11 November 2004 (2004-11-11) * paragraph [0032] - paragraph [0042]; figures 1-6 *	1-9	INV. A43B7/08
P,X	----- WO 2007/057388 A (MIAO YOU CING [IT]) 24 May 2007 (2007-05-24) * page 3, lines 18-27 * * page 4, lines 13-29 * * figures *	1-9	
X	----- WO 94/09661 A (SUGDEN KURT DAVID [GB]) 11 May 1994 (1994-05-11) * the whole document *	1-9	
A	----- US 5 921 003 A (KIM INSOP [US]) 13 July 1999 (1999-07-13) * the whole document *	1-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			A43B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 August 2008	Examiner Cianci, Sabino
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 08 42 5344

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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22-08-2008

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REFERENCES CITED IN THE DESCRIPTION

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- WO 2007010583 A1 [0005]
- US 20060143943 A1 [0008]
- US 6370799 B1 [0008]