(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 946 663 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
23.07.2008 Bulletin 2008/30

(51) Int Cl.:
A43B 7/08 *(2006.01)* ***A43B 7/04*** *(2006.01)*

(21) Application number: **07021617.1**

(22) Date of filing: **07.11.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(30) Priority: **16.01.2007 IT MC20070007**

(71) Applicant: **Immobiliare Ramadoro S.R.L.**
60044 Fabriano (AN) (IT)

(72) Inventor: **Ramadoro, Franco**
60044 Fabriano (AN) (IT)

(74) Representative: **Baldi, Claudio**
Viale Cavallotti, 13
60035 Jesi (AN) (IT)

(54) **Shoe sole with forced ventilation**

(57) This invention relates to a shoe sole (1) with forced ventilation that incorporates an electrically-powered fan (7) that creates a depression to bring the air contained in the upper inside the sole (1), and convey the same air into a duct that ejects it outside through a suitable vent hole (11) obtained in lateral position on the sole (1).

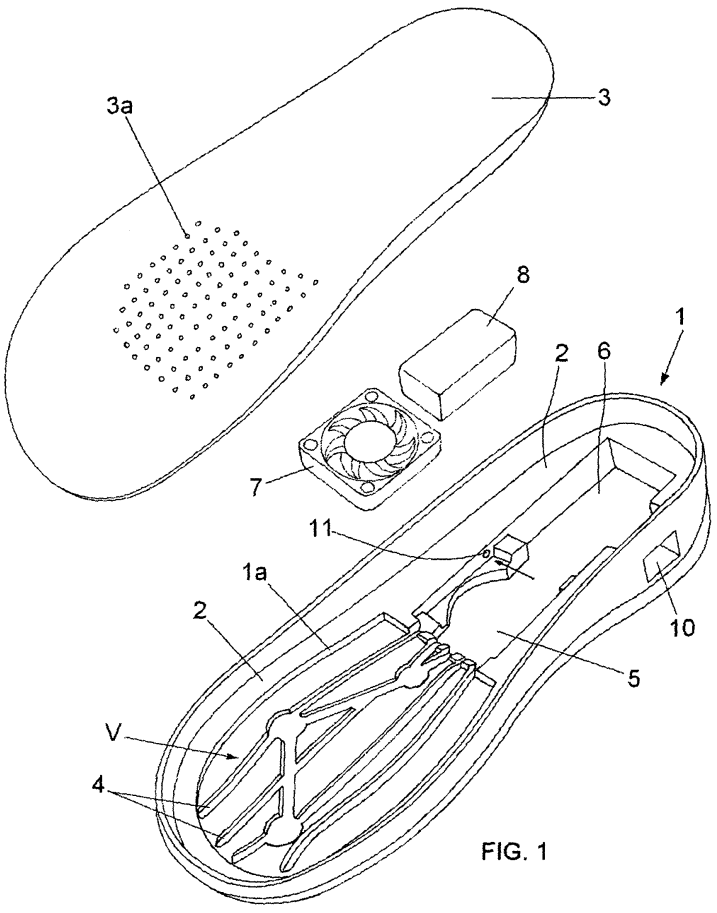

FIG. 1

EP 1 946 663 A1

Description

[0001] This patent application for industrial invention relates to a shoe sole with forced ventilation.

[0002] The so-called ventilated shoes are quite popular on the market, that is to say shoes that are able to ensure air circulation inside the upper during walking.

[0003] According to the manufacturers' intention, the said shoes should increase the comfort and hygienic quality of the shoe, in view of the air circulation that reaches the user's foot with cooling effect.

[0004] To that end, the current models of ventilated shoes are all inspired by the same technology, which is rather popular regardless of the fact that it is not fully satisfactory from the technical-functional viewpoint.

[0005] According to the said technology, one or more compartments are provided on the lowered upper side of the sole in order to house corresponding pumping pads with compressible structure obtained from suitable plastic materials.

[0006] According to the same technology, the entire upper side of the sole (and consequently the aforementioned compartments that house the pumping pads) is closed with an insole provided with a plurality of through holes.

[0007] The said pumping pads are cyclically subjected to a compression phase induced by the user's weight, which is discharged on the said pads during the impact of the shoe with the ground and, to an expansion phase during the next movement in the air.

[0008] During the said compression phase, each pumping pad ejects the air that was previously received into the corresponding housing (by means of a suitable vent duct).

[0009] On the contrary, during expansion, the said pumping pad spontaneously tends to "enlarge", thus introducing new air from the upper inside the corresponding housing.

[0010] Of course, the forced circulation of the air contained in the upper towards the sole is made possibly by the presence of the insole between the upper and the sole and, more precisely, by the presence of the through holes that cover the entire surface of the insole.

[0011] Nevertheless, the long practical experience has shown that traditional ventilated shoes are not able to provide, if not in imperceptible extent, air exchange inside the shoe, due to the very limited overpressure and depression values produced by the said elastic pumping pads, and to the unavoidable load losses that occur to the detriment of the air exchange flows.

[0012] Moreover, a similar traditional ventilated shoe also requires the presence of a unidirectional valve in the proximity of the vent hole designed to convey the air outside of the shoe, to avoid receiving air from the outside of the sole every time the pumping pads are subjected to expansion.

[0013] A careful examination of the said limitations of the aforementioned prior technique has led to the development of an alternative technical solution able to provide shoes with real ventilation effect.

[0014] After acknowledging the functional inefficacy of the said pumping pads, the applicant has decided to insert an electrically-powered fan in the sole, which is finally able to provide air exchange from the inside towards the outside of the upper with sufficient strength and efficacy.

[0015] Of course, a similar device requires a battery and an externally-operated switch that is actuated by the user to activate the air exchange while wearing the shoe, and deactivated as soon as the user takes the shoe off to avoid energy waste.

[0016] For the practical actuation of the said inventive idea, the upper side of the sole is provided with a compartment to house the fan with vertical axis and an adjacent compartment for the battery.

[0017] Moreover, the bottom of the fan compartment is provided with small channels on the surface of the upper side of the sole, and the top of the fan compartment is provided with the opening of a small duct that ends outside of the shoe in order to ensure the necessary air flow.

[0018] The correct operation of the sole of the invention also requires that the upper side is covered with an insole with a plurality of through holes on the majority of the front surface, which closes the fan compartment from above.

[0019] The actuation of the fan brings the air contained in the upper of the shoe inside the bottom of the fan compartment.

[0020] In particular, because of the depression created by the fan, the air contained in the upper is sucked towards the sole through the holes provided on the insole; then, the air reaches the bottom of the fan compartment, being conveyed by the small channels obtained on the upper side of the sole of the invention.

[0021] Of course, the air flow that penetrates the bottom of the fan compartment is additionally conveyed by the fan towards the top of the compartment that is closed on top by the insole.

[0022] In view of the above, the forced air flow penetrates the opening of the vent duct situated on the top of the fan compartment, finally reaching the outside of the sole.

[0023] Based on this general description, the main advantages of the sole of the invention with respect to the prior technique appear evident, consisting in excellent functional efficacy (meaning the actual capability of ventilating the user's foot) and lower constructive complexity, with specific reference to the configuration of the hole used for air outflow.

[0024] In fact, the presence of the "unidirectional" fan instead of the traditional pumping pads with "double effect" allows to avoid that the hole used for air outflow is subjected to depression, thus attracting, rather than ejecting, air from the outside.

[0025] This eliminates the need to mount the unidirectional valve that is typically mounted on the outflow hole

of traditional ventilated soles, contributing to cost increase and complex design and construction.

[0026] In fact, in the sole of the invention the outflow hole can be eventually provided with a simple air-permeable and water-impermeable membrane designed to prevent the access of rain inside the sole.

[0027] Another important advantage of the new sole of the invention consists in the fact that foot ventilation is ensured also in static position (i.e. without walking) unlike traditional ventilated soles with compressible pads that, as mentioned above, provide air circulation exclusively during walking.

[0028] Finally, it must be noted that the insole provided with the sole of the invention can be easily removed by the user to access the battery associated with the fan and replace it when necessary.

[0029] For more clarity the description of the invention continues with reference to the enclosed drawing, which is intended for purposes of illustration only and not in a limiting sense, whereby:

- Fig. 1 is an exploded axonometric view of the sole of the invention;
- Fig. 2 is a cross-sectional view of the same sole with a longitudinal plane passing through one of the grooves provided on the front half-sole.

[0030] Referring to the aforementioned figures, the sole of the invention (1), which is preferably obtained with moulded plastic materials, has the upper side surrounded by a perimeter border (2) that supports a preferably anatomical insole (3) provided with a plurality of through holes (3a) on the front half-sole.

[0031] In particular, the perimeter border (2) surrounds a surface of the front half-sole provided with a series of basically longitudinal partitions (4) that create a series of narrow intermediate channels (4a).

[0032] As seen in the sole illustrated in the aforementioned figures, the top of the partitions (4) is positioned at a lower height than the perimeter border (2), with the consequence that the insole (3) is only supported by the perimeter border (2).

[0033] In view of the above, the insole (3) basically closes a compartment (V) provided with longitudinal channels (4a) on the bottom on the front half-sole.

[0034] Consequently, the holes (3a) of the insole (3) occupy a surface that is basically the same as the compartment (V) obtained in the sole of the invention (1).

[0035] Considering that the insole (3) is situated between the sole of the invention (1) and the inside of the upper, it appears evident that the position of the holes (3a) of the insole (3) ensures the desired air flow from the upper to the compartment (V) of the sole (1).

[0036] The perimeter border (2) surrounds a pair of compartments (5, 6) on the heel, the first compartment (5) being preferably situated in the front to house an electrically-powered fan (7) with rotation axis in vertical direction, and the second compartment (6) being designed to house the corresponding battery (8).

[0037] The battery (8) is associated with a corresponding actuation switch (9) that can be accessed by the user on the outside of the sole (1), being contained in a corresponding housing (10) obtained on the external side of the sole (1).

[0038] The fan (7) is situated at approximately half of the height of the corresponding compartment (5), in such a way that it creates a first chamber (C1) and a second chamber (C2) inside the same compartment (5).

[0039] The small channels (4a) obtained on the front half-sole end in the compartment (5) that houses the fan (7) on the bottom of the first chamber (C1).

[0040] The second chamber (C2), which is closed on top by the insole (3), is laterally provided with a small hole (11) that leads to a duct ending outside on the side of the sole (1).

[0041] As mentioned above, the operation of the sole (1) is such that the actuation of the external switch (9) enables to power the fan (7) with the battery (8).

[0042] The actuation of the fan (7) creates a depression in the first chamber (C1) and also in the entire compartment (V) situated on the front half-sole of the sole (1) because of the presence of the channels (4a) that end in the said first chamber (C1).

[0043] The depression created in the compartment (V) generates a forced circulation of the air contained in the upper through the holes (3a) obtained in that area of the insole (3).

[0044] Because of the presence of the channels (4a), the air received in the compartment (V) penetrates the depression chamber (C1) and is pushed by the fan (7) into the second chamber (C2) that is closed on top by the insole (3), which is not provided with through holes in this area.

[0045] The forced air flow that reaches the closed chamber (C2) is forced to pass through the said hole (11) and is ejected outside of the sole (1) through the vent hole situated on the side of the sole (1).

[0046] Alternative constructive solutions for the sole of the invention (1) are possible without leaving the scope of the present inventive idea.

[0047] For instance, the top of the partitions (4) obtained on the upper surface of the front half-sole may be situated at the same height as the perimeter border (2) that surrounds the said surface.

[0048] In such a case, the insole (3) rests on the longitudinal partitions (4), and not only on the perimeter border (2), thus limiting the useful space for air circulation to the channels (4a) between the said partitions (4).

[0049] In view of the above, the holes (3a) of the insole (3) are no longer situated on the entire front surface of the insole (3), but only along basically longitudinal lines that occupy the same position as the channels (4a) of the sole under the insole (3).

[0050] According to another constructive version, the fan (7) is mounted inside the compartment (5) with rotation axis in horizontal position.

[0051] In this way, the depression chamber (C1) and the delivery chamber (C2) have a basically vertical development, with the fan (7) in intermediate position between them.

[0052] Finally, the battery (8) preferably consists in an ordinary battery that can be inserted or extracted from the corresponding housing (6) by temporarily removing the insole (3).

Claims

1. Shoe sole with forced ventilation, of the type provided with an upper perimeter border (2) that supports an insole (3) provided on the front half-sole with a plurality of through holes (3a) through which the air contained in the upper is forced into the sole (1) and then conveyed outside through a vent hole obtained on the side of the sole (1), sole **characterised by** the fact that the front half-sole is provided with a series of basically longitudinal small channels (4a) that end in a depression chamber (C1) in communication with a delivery chamber (C2), with the interposition of a fan (7) powered by a battery (8) and controlled by a switch (9) that can be accessed on the outside of the sole (1); it being provided that the delivery chamber (C2) is closed by the insole (3) and is provided on one of the walls with a small hole (11) that takes the forced air flow produced by the fan (7) through a duct leading to the external vent hole.

2. Sole as claimed in claim 1, **characterised by** the fact that the depression chamber (C1) and the delivery chamber (C2) are obtained inside a compartment (5) that houses the fan (7) with rotation axis in vertical position at approximately half of its height.

3. Sole as claimed in claim 1, **characterised by** the fact that the depression chamber (C1) and the delivery chamber (C2) are obtained inside a compartment (5) that houses the fan (7) with rotation axis in horizontal position at approximately half of its length.

4. Sole as claimed in one or more of the preceding claims, **characterised by** the fact that the battery (8) of the fan (7) is housed inside a corresponding compartment (6) adjacent to the aforementioned compartment (5) that houses the fan (7).

5. Sole as claimed in one or more of the preceding claims, **characterised by** the fact that the switch (9) used to control the battery (8) is contained in a suitable housing (10) obtained on the side of the sole (1).

6. Sole as claimed in one or more of the preceding claims, **characterised by** the fact that the channels (4a) obtained on the front half-sole are bordered by basically longitudinal partitions (4) with the top positioned at a lower height than the perimeter border (2) that surrounds the sole (1).

7. Sole as claimed in one or more of claims 1 to 5, **characterised by** the fact that the channels (4a) obtained on the front half-sole are bordered by basically longitudinal partitions (4) with the top positioned at the same height as the perimeter border (2) that surrounds the sole (1).

8. Sole as claimed in claim 7, **characterised by** the fact that it is provided with an insole (3) with through holes (3a) along basically longitudinal lines that are situated in the same position as the channels (4a) obtained on the upper side of the sole (1) under the insole (3).

9. Sole as claimed in one or more of the preceding claims, **characterised by** the fact that the lateral vent hole is provided with an air-permeable water-impermeable membrane.

10. Sole as claimed in one or more of the preceding claims, **characterised by** the fact that the battery (8) is an ordinary replaceable battery.

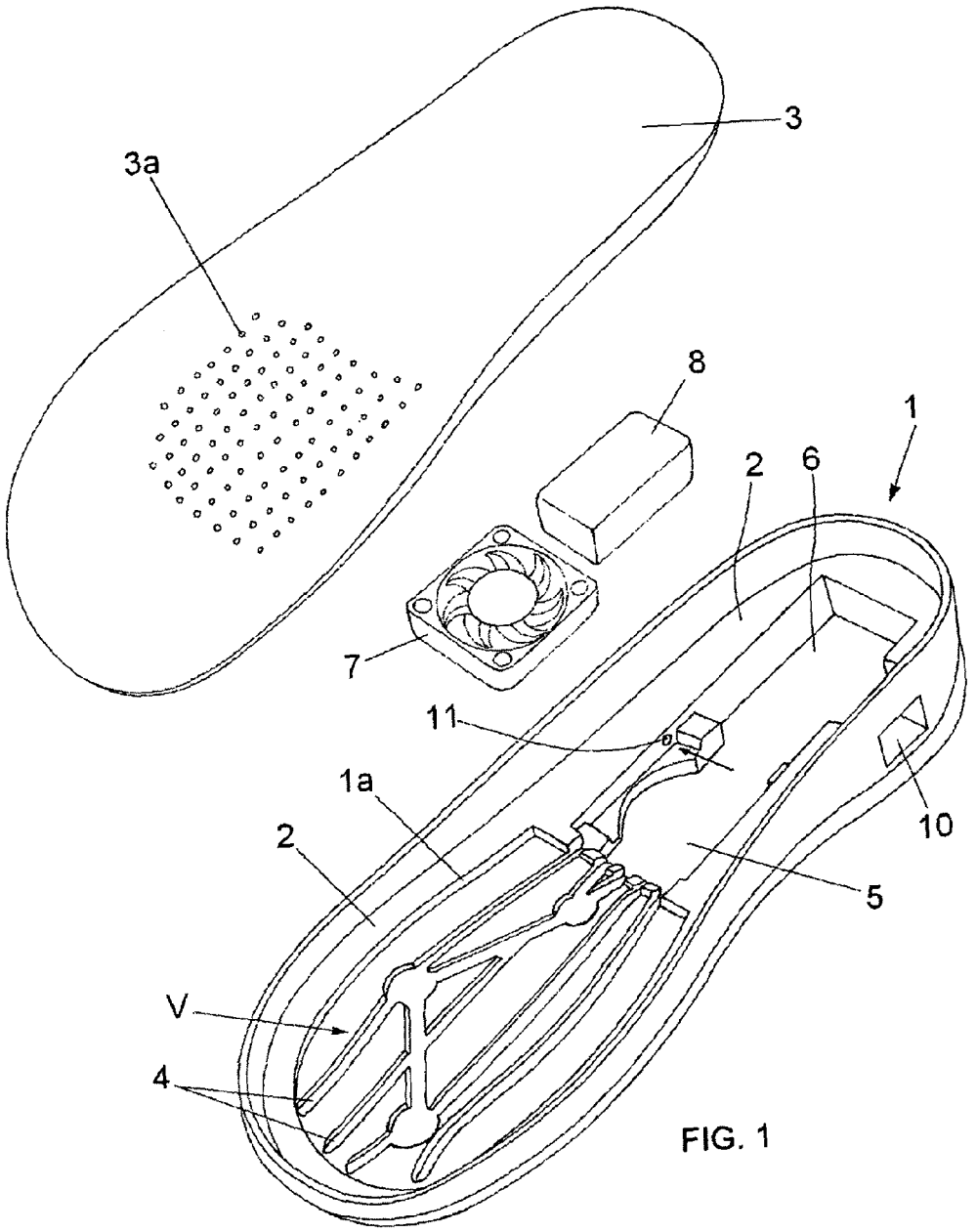

FIG. 1

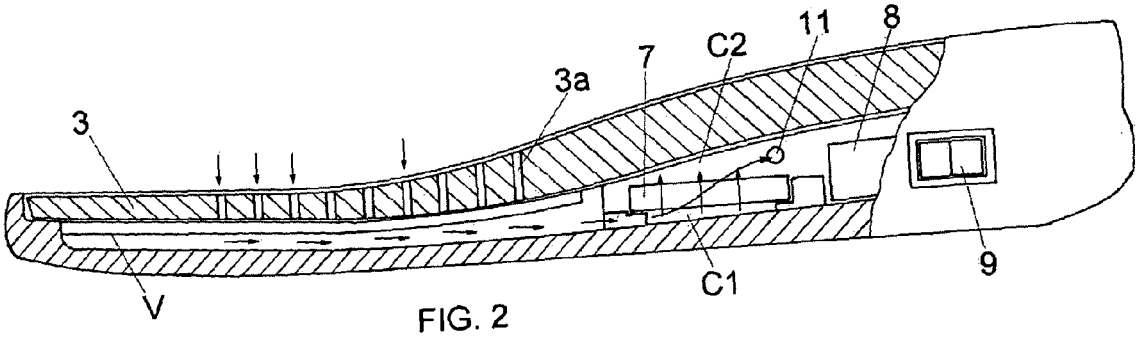

FIG. 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 02 1617

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 6 041 518 A (POLYCARPE PHITO [US]) 28 March 2000 (2000-03-28) * column 2, line 52 - column 3, line 46; figures *	1	INV. A43B7/08 A43B7/04
A	US 2004/020076 A1 (LIU KUN-CHUNG [TW]) 5 February 2004 (2004-02-05) * paragraph [0019] - paragraph [0022]; figures 2-5 *	1	
A	US 3 048 931 A (FARINELLO ANTHONY S) 14 August 1962 (1962-08-14) * column 1, line 52 - column 3, line 21; figures *	1	
A	US 3 273 264 A (FARINELLO JR ANTHONY S) 20 September 1966 (1966-09-20) * column 2; figures *	1	
A	DE 203 20 133 U1 (SOFULAR SINAN [DE]) 22 April 2004 (2004-04-22) * paragraph [0013]; figures *	1	TECHNICAL FIELDS SEARCHED (IPC) A43B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	17 April 2008	Herry, Manuel

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 07 02 1617

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-04-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 6041518 A	28-03-2000	NONE	
US 2004020076 A1	05-02-2004	NONE	
US 3048931 A	14-08-1962	NONE	
US 3273264 A	20-09-1966	NONE	
DE 20320133 U1	22-04-2004	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82