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(71) Applicant: **I.P.R. S.p.A.**
62012 Civitanova Marche (MC) (IT)

(72) Inventor: **Paniconi, Fabrizio**
63023 Fermo (AP) (IT)

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(74) Representative: **Baldi, Claudio**
Piazza Ghislieri, 3
60035 Jesi (Ancona) (IT)

(54) Improved shoe sole capable of generating forced ventilation inside the shoe

(57) The present invention refers to a shoe sole (1) capable of generating forced ventilation inside the shoe; the sole comprises a seat (1a) excavated on the front half plant, from which a small channel (2) originates, be-

ing realised on the upper surface of the sole and ending on one lateral wall of the sole, closed at the end by a unidirectional valve (3), which is connected to the seat by means of a flexible tube (5) housed inside the channel.

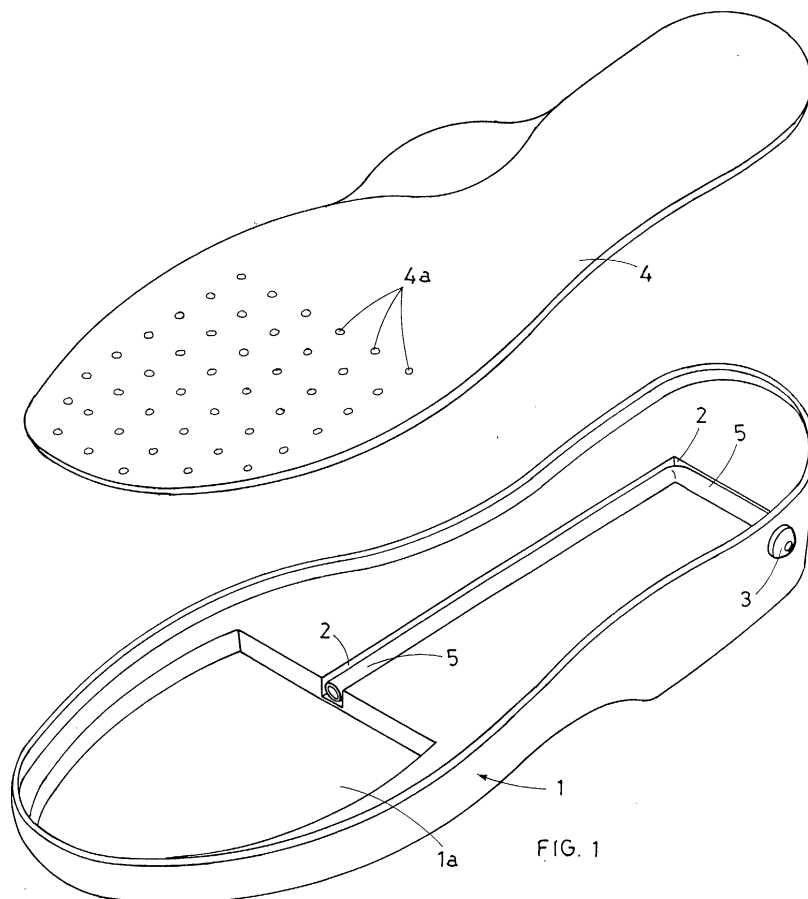


FIG. 1

EP 1 293 141 A1

Description

[0001] The present patent application refers to a shoe sole of the type provided with means able to generate forced ventilation of the foot during walking, using the pressure rhythmically exercised by the foot on the sole.

[0002] As it is known, the heel is the first part of the foot to touch the ground when walking, thus pressing the heel of the shoe. The body weight is then gradually discharged on the half plant and finally on the toes, when the heel is lifted to take another step.

[0003] This means that the heel and the half plant are alternatively and rhythmically subject to compression, which can be used to generate a pump effect and create forced ventilation inside the shoe.

[0004] To this purpose "self-ventilated" shoes have already been devised, characterised in that they use soles with one or more seats excavated on the upper plant and mid-soles with small holes, which create a communication way between the inside of the shoe and the sole cavities.

[0005] To generate the aforementioned pump effect, the sole cavities are externally connected by means of a small channel excavated on the upper plant of the sole, which usually ends on the sides of the heel and is closed by means of a unidirectional valve, so that the same channel can act as aspiration or ventilation conduit, according to the direction of the air inside the valve.

[0006] Most of the times, this type of soles is made of elastically flexible materials and houses deformable pads or mats inside the cavities to favour and intensify the pump effect.

[0007] The ventilation of the shoe can be obtained in two different ways: by aspirating stale air from the shoe and discharging it outside through the unidirectional valve, or aspirating fresh air from the outside through the valve and introducing it inside the shoe.

[0008] In any case the air flow must pass through the conduit or conduits that connect the internal cavities of the sole with the outside, with consequent load losses that could considerably attenuate, if not completely cancel, the effects of the pumping action exercised by the foot.

[0009] It appears evident that the pressure variations inside the sole cavities are not high. For this reason, the compression or depression of the air might not be sufficient to open the unidirectional valve, thus causing the simple rhythmic compression of the air contained in the sole cavities, or an alternate passage of stale air from the shoe to the sole and vice versa, without introducing fresh air inside the shoe.

[0010] In order to avoid this inconvenience, air conduits with very small cross-section are preferably realised, so that the air that stagnates in them represents a minimum percentage of the air contained in the sole cavities. It appears evident that, otherwise, the pump effect could simply cause the passage of the air contained in the conduits to the cavities and vice versa, without caus-

ing air movement inside the shoe.

[0011] The need for small cross-section conduits, however, contradicts the need to prevent the risk of accidental occlusion when assembling or using the shoe.

[0012] To this regard it must be said that the mid-sole is glued on the upper plant of the sole, with a high risk of glue drops or leakage falling or penetrating in the conduits, with deposits on the internal walls.

[0013] The glue deposits produce negative effects proportioned to the conduit cross-section, both in terms of load losses and risk of total occlusion.

[0014] It must be said that compromising solutions have been found so far, capable of satisfying only one of the two requirements, while being detrimental to the other one.

[0015] The purpose of the present invention is to find a solution that allows for reducing the cross-section of the conduits in which air is conveyed as desired, without the risk that such a reduction may favour partial or total occlusion due to possible deposits of the glue used to fix the mid-sole to the sole.

[0016] This objective has been achieved by the sole according to the present invention, which is characterised by the fact that it uses sections of flexible tube housed inside the conduits excavated on the upper surface of the sole, designed to connect the internal cavities with the external walls of the sole.

[0017] On the other hand, while keeping unchanged the cross-section of the channel excavated on the sole, it is always possible to change the cross-section for the passage of air by replacing the tube with another tube of different internal diameter, thus adjusting the intensity of the pump effect, adjusting it from time to time to the type of ventilated shoe to be realised.

[0018] For major clarity the description of the invention continues with reference to the enclosed drawing, which is intended for purposes of illustration and not in a limiting sense, whereby:

- Fig. 1 is a perspective top view of the sole of the invention, which shows the upper surface before being covered with the mid-sole.

[0019] With reference to the aforementioned figure, the sole (1) of the invention comprises a seat (1) excavated on the front half plant designed to house means (of known type and therefore not illustrated in the figure) capable of being elastically deformed when pressed, which allow for the reduction of the cavity volume during the compacting phase, thus compressing the air contained in it.

[0020] According to known solutions, these means may consist in a series of elastically flexible partitions or pegs protruding protrude from the bottom wall of the seat (1) or in open-cell soft, elastically flexible alveolar pads, with suitable dimensions and shape in order to be housed in the seat (1).

[0021] A channel (2) originates from the seat (1) and

ends on one lateral wall of the sole, which in the specific case coincides with the external side of the heel.

[0022] The channel (2) is occluded at the end with a unidirectional valve (3), able to favour rhythmic forced ventilation of the shoe in co-operation with the dense series of holes (4a) on the mid-sole (4) on the front part, above the excavated seat (1a) of the sole (1). 5

[0023] As mentioned earlier, the intercommunication between the inside of the shoe and the sole (1) provided by the holes (4) on the mid-sole (5) allows fresh air to flow inside the shoe at each step, taking advantage of the pump effect generated by the foot when walking. 10

[0024] The peculiarity of the sole of the invention consists in the fact that it comprises a flexible tube (5) housed inside the channel (2), so that the air masses moved by the pumping action can flow along the tube (5), whose internal cross-section can be as small as desired, according to the designer's preference, regardless of the width of the channel (2) that houses it. 15

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Claims

1. Improved shoe sole capable of generating forced ventilation inside the shoe, which comprises: 25

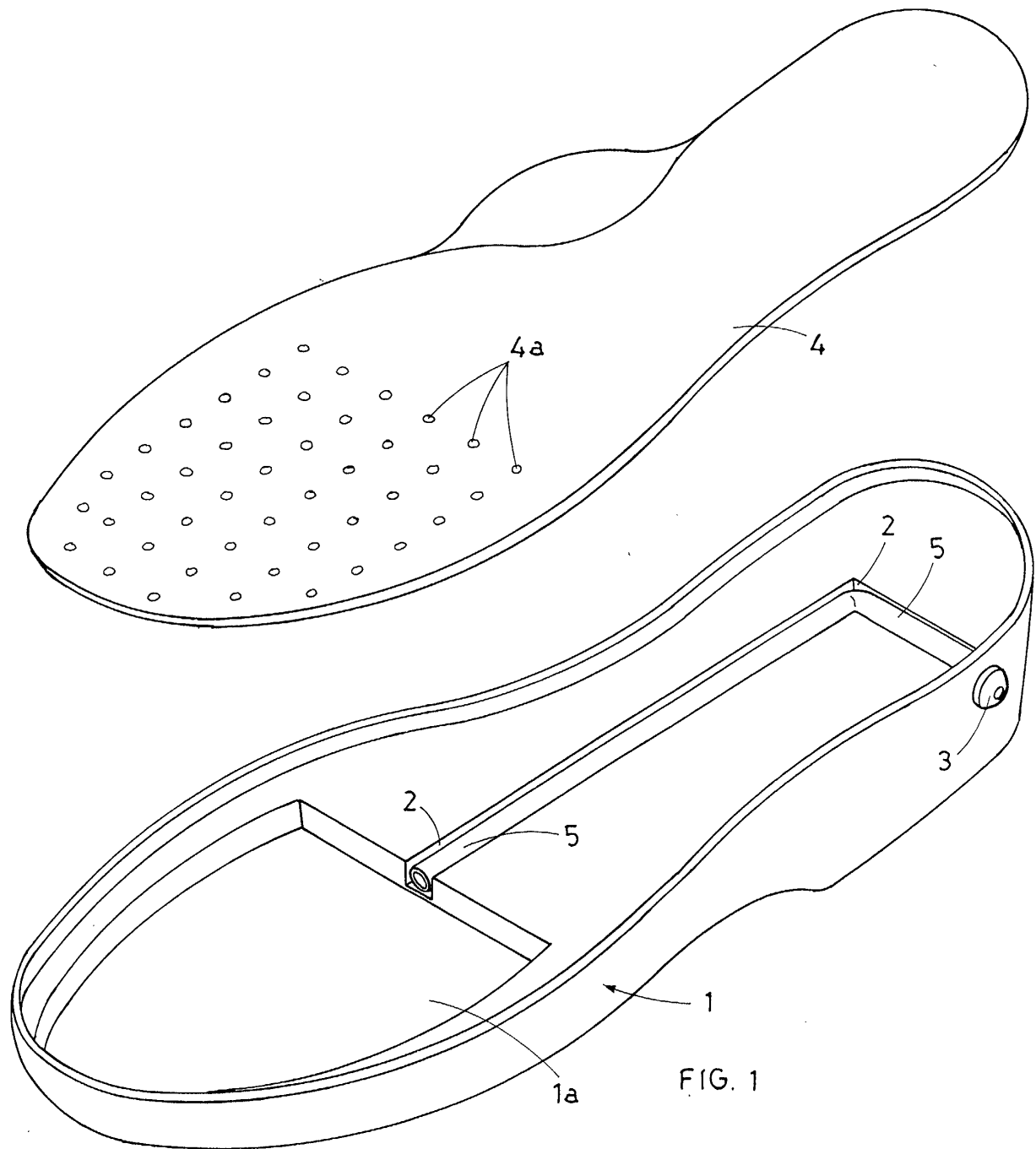
- a seat (1) excavated on the front half plant, designed to house means capable of being elastically deformed when pressed, which allow for the reduction of the cavity volume during the compacting phase, thus compressing the air contained in it; 30
- a channel (2) excavated on the upper surface of the sole, which originates from the seat (1a) and ends on one lateral wall of the sole, closed at the external end with a unidirectional valve (3); 35

characterised in that it comprises a flexible tube (5) housed in the channel (2) and having a suitable length to connect and put in communication the valve (3) and the cavity (4). 40

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EUROPEAN SEARCH REPORT

Application Number
EP 02 42 5560

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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.7) A43B
Place of search THE HAGUE		Date of completion of the search 18 December 2002	Examiner Claudel, B
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
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