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(11) **EP 1 604 580 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:

14.12.2005 Bulletin 2005/50

(51) Int Cl.7: **A43B 13/18, A43B 21/30**

(21) Application number: **04380264.4**

(22) Date of filing: **16.12.2004**

(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 MC NL PL PT RO SE SI SK TR**

Designated Extension States:

AL BA HR LV MK YU

(71) Applicant: **The A.R.T. Company B&S, S.A.**
26570 Quel La Rioja (ES)

(72) Inventor: **Marin Perez, Jose Luis**
26570 Quel, La Rioja (ES)

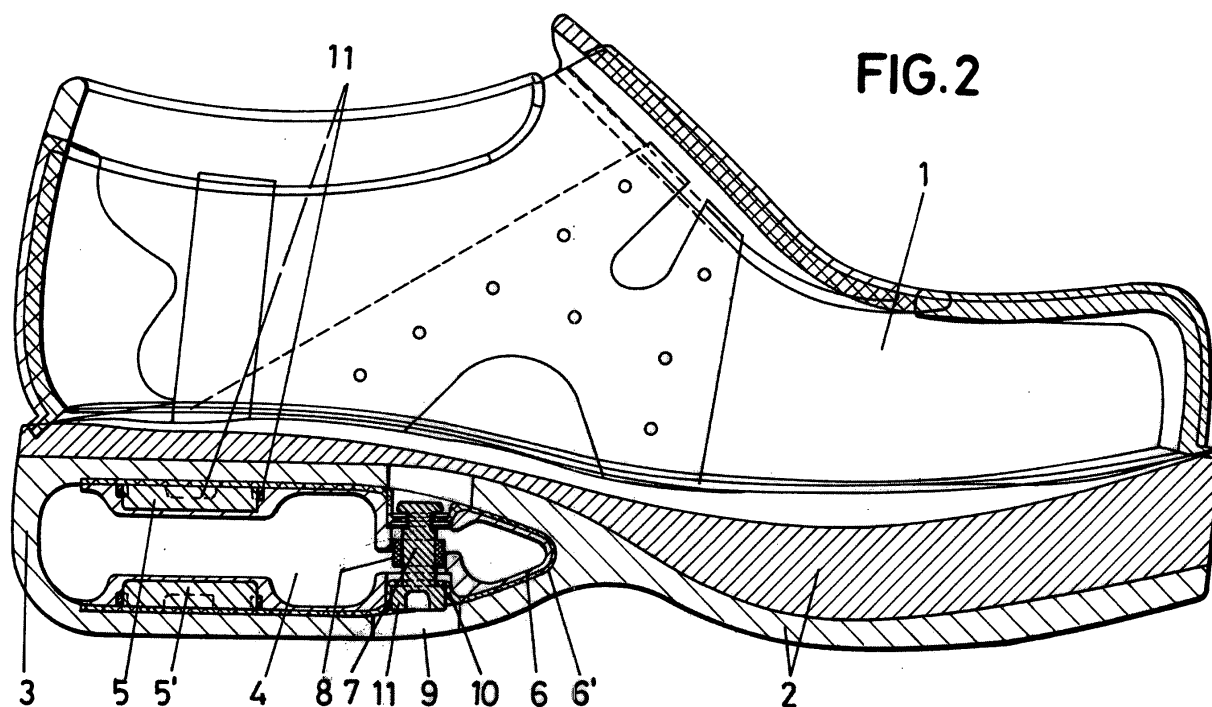
(74) Representative: **Maldonado Jordan, Julia**
Linares, 7 Pta. 3
46018 Valencia (ES)

(30) Priority: **10.06.2004 ES 200401417**

(54) **Damping system for shoe soles**

(57) Specifically intended for the area of the sole (2) corresponding to the heel (3) of the shoe, it is materialized in an ample chamber (4) for the most part affecting said heel (3) and which is preferably open towards the sides of the sole (2), a chamber wherein a pair of permanent magnets (5-5') is arranged, coaxial, facing one another through sides of the same polarity, such that they tend to be repelled from one another, these mag-

nets constituting the fundamental damping element of the system, which is completed with a leaf spring (6), the side branches of which are respectively adapted to the upper and lower sides of the chamber (4), furthermore constituting the physical support for the magnets (5-5') and the tension of said leaf spring (6) being adjustable by means of the screw and nut (7) and (8) assembly, which is accessible through an opening (9) of the lower side of the heel.



EP 1 604 580 A1

Description

OBJECT OF THE INVENTION

[0001] The present invention refers to a new damping system for shoe soles, especially for the rear area thereof, corresponding to the heel, in order to reduce or absorb the force of impact generated on the heel when walking or running, with the subsequent improvement of the biomechanical and ergonomic performance of the shoe as a whole for the user thereof.

[0002] The object of the invention is to achieve, parallelly to said damping effect, a rebound effect which facilitates walking. Achieving that the damping effect is adjustable for the purpose of being adjusted to the tastes and preferences of each user is also object of the invention.

BACKGROUND OF THE INVENTION

[0003] Evidently, providing a shoe sole with elastic features, especially at the heel level, implies an improvement in the comfort of the shoe as it dampens the impacts occurring when supporting the foot on the ground.

[0004] In this sense there are different solutions, ranging from the use of elastically compressible materials to the use of air chambers, springs of different types, etc.

[0005] Independently of their greater or lesser effectiveness, since in many cases the functional results are questionable, and even occasionally are mere appearances to catch the attention of the users, all known damping systems have as a common denominator the fact that the elastic means granting them their damping character are pre-established beforehand, i.e. if springs are used, for example, they are previously scaled at a determined working tension, which does not allow any possibility of variation according to the features of the user, such as his body weight for example, his manner of walking, etc.

[0006] Furthermore, said damping means definitively condition the aesthetics of the shoe.

DESCRIPTION OF THE INVENTION

[0007] The system proposed by the invention bases its functional philosophy on the effect and force of the interaction of the magnetic fields of permanent magnets, such that by separating the heel of the sole into two superimposed and suitably spaced areas and suitably arranging and fixing thereto respective permanent magnets, with their polarities of the same sign facing, a repulsion force is achieved which, as is known, is inversely proportional to the square of the distance separating them, in turn achieving a levitation effect, from which optimal damping conditions are in turn derived.

[0008] According to another feature of the invention, it has been provided that said permanent magnets, with

a suitable magnetic power, are assembled on leaf springs which are suitably fitted and fixed in the hollow interior of the heel, with the special particularity that such leaf springs are aided by a screw and nut assembly, which allows for regulating, at the discretion of the user, the degree of tension to be supplied by the springs, in this case with a linear deformability, such that the damping effect of the system, as well as the rebound effect when carrying out an activity, can be adjusted according to the criterion of the user, according to his preferences or the activity to be carried out, in any case achieving optimal results from the biomechanical and ergonomic point of view.

[0009] The system allows for the damping mechanisms to be hidden for the most part, such that their invisibility allows improving and changing the aesthetics of the shoe, adapting it to any design line.

DESCRIPTION OF THE DRAWINGS

[0010] To complement the description being made and for the purpose of aiding in better understanding the features of the invention, according to a preferred practical embodiment example thereof, a set of drawings is attached as an integral part of said description in which the following has been shown with an illustrative and non-limiting character:

Figure 1 shows an exploded perspective view of a shoe sole provided with the damping system constituting the object of the present invention.

Figure 2 shows a profile view of the assembly of parts from the previous figure, duly assembled, making up the sole, which in turn is attached to the upper complementing the shoe.

PREFERRED EMBODIMENT OF THE INVENTION

[0011] In the figures mentioned, especially in Figure 2, a certain practical embodiment example for a shoe to which the invention has been applied is shown, it being worth indicating that the configuration of said shoe follows a mere practical embodiment example which can vary with virtually no limitation to that respect whatsoever, and this not affecting the essence of the invention.

[0012] Whatever the configuration of the upper (1) of the shoe may be, as well as the configuration of its sole (2), the design of the lower side of the latter, etc., the system of the invention is centered on the fact that at the level of the heel (3), said sole (2) generates an ample chamber (4), preferably open towards the side areas of the sole, as shown in Figure 1, although it could also be closed, a chamber (4) in which, according to the essential character of the invention, a pair of permanent magnets (5-5') is arranged, coaxial, facing through coinciding poles, such that a considerable repulsive force is generated between them, one of said magnets (5) obviously being situated on the upper base of the chamber

(4) and the other one (5') on the lower base, and at all times tending to keep the heel (3) as a whole in maximum height conditions for the chamber (4).

[0013] A leaf spring (6) is also included in the system, intended for being tightly fitted in the chamber (4) and with three purposes, on one hand to suitably fix and position the permanent magnets (5-5') at all times, on the other hand to complement the effect of said magnets due to its own elastic nature and as a damping complement, and finally to allow an adjustment in the damping of the system in order to adapt it to the preference needs of the user, as a result of the fact that the two arms of the leaf spring (6) are linked by means of a screw (7) and its complementary nut (8), which can be accessed through a small opening (9) of the base of the heel (3).

[0014] In practice and according to the example shown in Figure 1, two spring strips (6-6') can be included in the system, intended for being adapted to one another with the interposition of the permanent magnets (5-5'), doubling the leaf spring effect and facilitating the fixing of said permanent magnets, one of these leaf springs (6') having interior choked-throat collars (10) for the passage of the screw (7) and a seating for the nut (8) and the head (11) of said screw (7), while at the same time also incorporating in the end area of its side branches die-cut pins (12) for coupling the permanent magnets (5-5') under pressure.

[0015] This structuring implies that the shoe, in the forefoot area, must be of a material of high elasticity and high recovery force, furthermore being resistant to wear, in order to collect the rebound of the heel and easily and comfortably transmit a large impulse to the forefoot.

[0016] According to this structuring, when the user carries out the operations of walking or running, the following effects occur:

[0017] First, the impact of the heel with the ground is dampened, absorbing the majority of the energy due to the effect of the approximation of the magnets and the bending of the leaf spring, a smooth deformation occurring and the system accumulating energy.

[0018] In passing from the heel to the mid-foot and forefoot, continuing with the movement, the time is notably reduced given that while the damping (prolonged) is occurring, the foot moves ahead, whereby reducing the impasse time between the heel and forefoot.

[0019] Finally, when the system tends to return to its original position, it returns the accumulated energy, the forefoot is arranged to be boosted from the ground, whereby it is catapulted with this accumulated complementary energy which is applied to the foot in the heel area, as if it were a rebound.

[0020] The action of walking is thus very considerably facilitated, obtaining as a result not only an aesthetically attractive and novel shoe, but also a comfortable one, without the least risk of injuries for the feet of the user and with a notable performance increase.

Claims

1. A damping system for shoe soles, being specially designed to be implemented in the area of said sole corresponding to the heel, and being of those incorporating elastic means absorbing the impact of the foot when walking and running, **characterized in that** the area of the sole corresponding to the heel (3) defines an ample chamber (4), preferably open sideways, wherein two permanent magnets (5-5') are arranged, coaxial and facing one another through coinciding polarities in order to generate in them a repulsion effect which enables maintaining the height level of the chamber (4) at a maximum level.
2. A damping system for shoe soles according to claim 1, **characterized in that** at least one U-shaped leaf spring (6) collaborates with said permanent magnets (5-5'), which in a laid position, adapts its side branches to the upper and lower walls of the chamber (4), said leaf spring (6) collaborating with the permanent magnets (5-5') in the damping effect, and also constituting the physical support for said magnets (5-5').
3. A damping system for shoe soles according to previous claims, **characterized in that** between the two branches of the leaf spring (6), a screw and nut (7-8) assembly is arranged which allows for adjusting at will the working position of the leaf spring (6) according to the needs or preferences of each user, said screw and nut (7-8) assembly being accessible from the outside through an opening (9) of the support base of the heel (3).

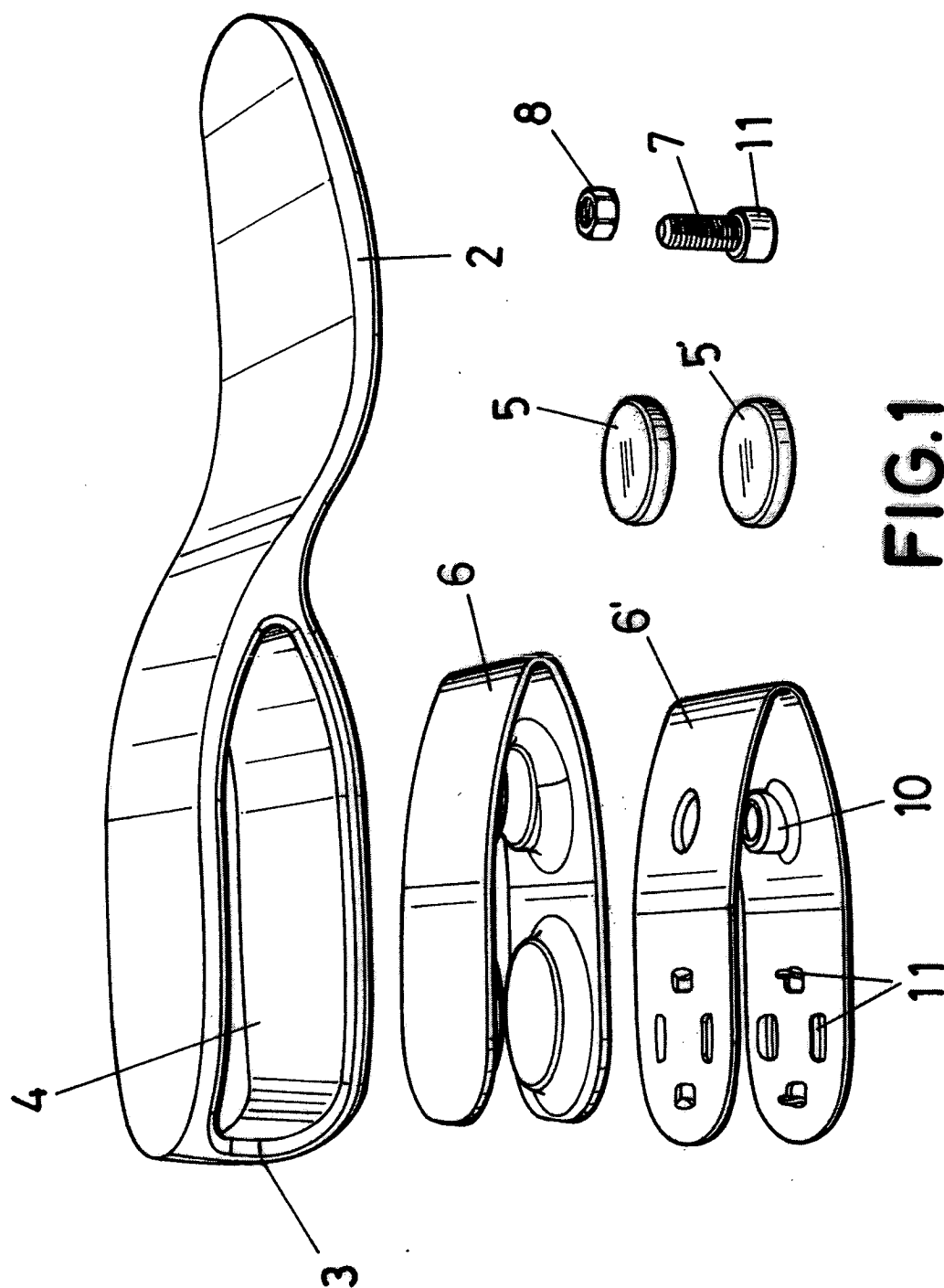
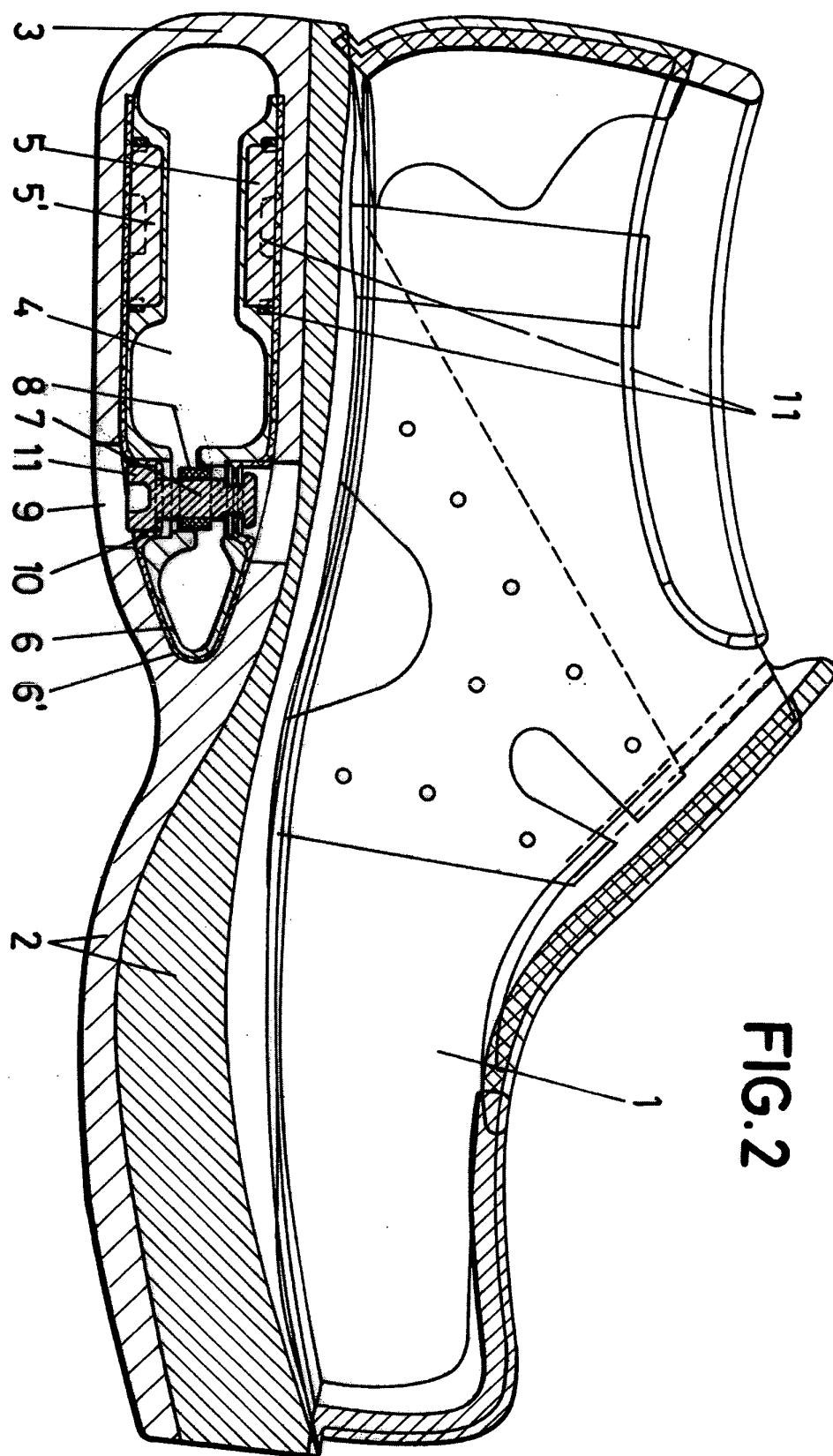


FIG.1





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EUROPEAN SEARCH REPORT

Application Number
EP 04 38 0264

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
E	WO 2005/034671 A (B & B TECHNOLOGIES LP) 21 April 2005 (2005-04-21) * the whole document *	1,2	A43B13/18 A43B21/30
X	US 5 502 901 A (BROWN ET AL) 2 April 1996 (1996-04-02) * column 4, line 36 - column 10, line 60; claims; figures *	1	
A	FR 2 407 684 A (TECHNISYNTHÈSE) 1 June 1979 (1979-06-01) * the whole document *	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A43B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		12 September 2005	Herry, M
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			

3
EPO FORM 1503 03.82 (P04C01)

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

EP 04 38 0264

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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12-09-2005

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