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Remarks:
Amended claims in accordance with Rule 137(2) EPC.

(54) **Insole and shoe comprising an electronic chip**

(57) The present invention relates to an innersole (1), in particular for a sports shoe, and shoe comprising an electronic chip (2). In order to provide a shoe, in particular a sports shoe, with an electronic chip in a more cost efficient way compared to the prior art, wherein the chip can easily be replaced or removed in case of failure or for recycling, the invention provides an innersole, in particular for a sports shoe, wherein the innersole comprises an electronic chip. It may be fitted into any kinds of shoes and may be readily replaced or removed, as is not an inherent part of the shoe.

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Description

[0001] The present invention relates to an insole and a shoe comprising an electronic chip.

[0002] For measuring the performance of an athlete, it is necessary to detect a speed profile and a distance achieved by the athlete, which can be accomplished by means of a shoe comprising an electronic chip.

[0003] A shoe comprising an electronic chip is known from the document DE 20 2004 012 749 A1. This shoe has an integrated transponder to transmit timing data to external measuring systems. The chip may be cast in the material of the sole at a previously defined point, sewn into the shoe upper portion, e.g. at the top right of the instep, or cast into an intermediate sole or sole insert. In case of a failure of the electronic chip, the chip cannot be removed or replaced without damaging the shoe.

[0004] According to the document FR 2 855 725 A, a module comprising a microprocessor is fitted from the outside into the heel portion of a sole of a boot. That solution requires a thick sole and heel portion, respectively. In sports shoes, such as football shoes, the heel portions are not thick enough to accommodate such a module without adversely affecting functionality or wearing comfort of the shoes.

[0005] The object of the invention is to provide a shoe, in particular a sports shoe, with an electronic chip in a more cost efficient way compared to the prior art, wherein the chip can easily be replaced or removed in case of failure or for recycling.

[0006] In order to solve the aforementioned object, the invention provides an insole, in particular for a sports shoe, said insole comprising an electronic chip. The insole with integrated chip may be fitted into any kinds of shoes and may be readily replaced or removed, as it is not an inherent part of the shoe. This solution is advantageous compared to the prior art in terms of manufacturing and recycling of the shoe and its components. The insole may be embodied as thermo-insole for skiing boots, for example. The chip can be integrated into the insole, so that it is undetachably combined with the insole, or can be detachably combined with the insole in order to be replaceable or removable without affecting the regular function of the insole, whichever is preferable. In the latter case, the chip can be made separately from the insole body, which may prove advantageous in terms of production efficiency. Usually the manufacturers of insoles and electronic chips operate in different fields of technology and have different fields of expertise. By providing standardized interfaces for the chip and an insole body, the production performance can be optimized. In this case, prefabricated chips can be mated with prefabricated insole bodies having different functions, shapes and/or sizes.

[0007] Preferred embodiments are claimed in the subclaims.

[0008] Preferably, said chip is embodied as a microprocessor and/or an active and/or passive transponder chip. A microprocessor may be suitable for carrying out complex operations. An active transponder chip is operative at any time required. A passive transponder chip requires an external power input, e.g. by means of electromagnetic induction or the like, but can be made very compact in size.

[0009] Preferably, said chip is accommodated in a heel portion, in an arch portion and/or in a ball portion of said insole. The position of the chip can be chosen in accordance with specific needs for specific applications.

[0010] Preferably, a body of said insole is made by foaming, casting, injection molding, laminating, punching, stamping and/or cutting, wherein said chip is preferably integrally formed or detachably combined with said insole body. The named methods prove to be useful and efficient in mass production. When the chip forms an inherent part of the insole and/or is embedded in the material of said insole, a wearing comfort is not deteriorated by the chip. After forming the insole by foaming, casting, injection molding and/or laminating, the insole may be tailored to its final shape and size by punching, stamping or cutting.

[0011] Preferably, said chip is accommodated between different layers of said insole. In this configuration, the chip can be undetachably combined with the insole.

[0012] In a preferred embodiment of the invention, said chip or a module comprising said chip is received within a receptacle of the insole. Preferably, the chip or module can be removably fitted into said receptacle. The receptacle may be a recess, indent, concave, hole or the like provided in the insole and may be formed by punching, stamping or cutting the insole. Alternatively, a mold or die for forming the insole may be provided with a male portion or protrusion or an insert for forming the receptacle. Alternatively, a preformed receptacle may be placed into the mold or die for forming the insole prior to the introduction of the material forming the insole, such that the preformed receptacle becomes an inherent part of the insole. The chip or module as well as the receptacle receiving same may have standardized dimensions. Therefore, the chip or module may be fitted into different insoles having different sizes and shapes, and may easily be replaced in case of failure or removed for recycling. As such, the costs for manufacturing the insole can be reduced.

[0013] Preferably, said receptacle receives said chip or module comprising said chip from a top side from or a bottom side of said insole. In the first case, the chip or module cannot be detached from the insole when a user wears a shoe provided with the insole and stands on the top side of the insole. When the user takes the shoe off, the chip or module can easily be replaced. In the second case, the chip or module is trapped between the insole and the sole of the shoe. Hence, even in the case the user takes the shoe off, the chip or module cannot be detached.

[0014] Preferably, said chip or module comprising said chip fits into said receptacle such that it completely clos-

es, fills and/or seals said receptacle, wherein the surface of chip or module is preferably flush with adjacent surface of the insole. Said receptacle and said chip or module may have complementary shapes. Furthermore, the chip or module may function as a cover of the receptacle and seal the receptacle in watertight fashion so as to prevent sweat or the like from entering. Most preferably, the chip is located on a side of the module facing the receptacle, such that the chip is provided in a watertight environment when the module closes and seals the receptacle. The insole according to this configuration provides a good wearing comfort and secures functionality of the chip over a long period of time.

[0015] Preferably, said chip or module comprising said chip and an insole body are substantially made from the same material, preferably from plastic, most preferably from ethylenvinylacetate (EVA), polyurethane (PU) and/or silicone. Such materials offer good damping characteristics and good wearing comfort. However, the chip or module comprising said chip and the insole body can be made from different materials with different viscosity properties and elasticity properties.

[0016] Preferably, said insole comprises energy generation means and/or energy storage means powering said chip, preferably a battery, most preferably a button-type battery. An energy generation means in accordance with the present invention may, for example, convert the pumping action the insole undergoes during walking or running into electrical power in order to power the chip. An energy storage means in accordance with the present invention may be a button-type battery, which is flat and consumes little space. Therefore, a wearing comfort is not deteriorated by such type of battery. Preferably, the battery is positioned next to the chip, such that a thickness of the insole can be minimized.

[0017] Preferably, said chip and/or the energy generation means and/or the energy storage means is sealed in a watertight fashion. The energy generation means and/or the energy storage means may be accommodated in a watertight receptacle comprising a watertight lining and/or a watertight cover. Further, the energy generation means and/or energy storage means may be positioned on a side of the cover facing the receptacle or on a side of the receptacle facing the cover. Still further, the energy generation means and/or energy storage means may be provided in/on a module comprising the chip and/or may be received in the same receptacle as the chip or module. In this case, the receptacle may comprise a watertight lining and/or a watertight cover, wherein the module may function as a watertight cover of said receptacle.

[0018] The object of the invention is also solved by a shoe, in particular a sports shoe, comprising a module provided with an electronic chip, wherein said module is detachably combined with said shoe, wherein said module is inserted and removed through the opening that receives a foot of a user of said shoe. The module comprising the electronic chip may be a retrofit device that can be removably accommodated in a predetermined space within said shoe without being visible from the outside. In case of failure or for recycling, the module can be easily replaced or removed. The module may comprise any one of the features of the module named above.

[0019] Preferably, said module can be received in a receptacle of said shoe. The module can be removably fitted into said receptacle without interfering with the foot of the user during use and without deteriorating the wearing comfort of the shoe. The module and the receptacle receiving same may have standardized dimensions. Accordingly, the same module may be fitted into different shoes, and may easily be replaced or removed in case of failure or for recycling. As such, the costs for manufacturing and recycling of shoes furnished with the chip can be reduced. The module and the receptacle may be configured as described above.

[0020] Preferably, said receptacle is provided in/on an insole, a lining, a tongue, an instep or a sole of said shoe. The insole may comprise any one of the features of the insole named above.

[0021] The object of the invention is also solved by a method of manufacturing an insole comprising an electronic chip, wherein a body of said insole is made by foaming, casting, injection molding, laminating, punching, stamping and/or cutting, wherein the chip is integrally formed or detachably combined with said insole. The insole may comprise any one of the features of the insole named above.

[0022] Further preferred embodiments may result from combinations of the aforementioned features.

Brief description of the drawings

[0023]

Fig. 1 is a top view of an insole in accordance with the present invention, wherein an electronic chip is integrally formed with a body of the insole and embedded in an arch portion of the insole.

Fig. 2 is a perspective view of an insole in accordance with the present invention, wherein a receptacle for a module carrying an electronic chip and a battery is defined between two layers in an arch portion of the insole.

Fig. 3 is a perspective view of a shoe comprising an insole in accordance with the present invention.

Detailed description of the preferred embodiments

[0024] Fig. 1 is a top view of an insole 1 in accordance with a first embodiment of the present invention.

[0025] The insole 1 depicted in Fig. 1 is configured for a sports shoe such as a football shoe or a running shoe. For ease of description, only a right insole 1 is depicted and described. The insole 1 may have symmetrical configurations for left and right shoes. The insole 1 has a

heel portion 3, an arch portion 4 and a ball portion 5, the portions being designated in accordance with the respective portions of a foot of a user standing thereon in use.

[0026] In the first embodiment of the present invention, an electronic chip 2 is integrally formed with the material of the insole 1 and embedded in an arch portion 4 of the insole 1. The chip 2 is embodied as a passive transponder chip that is powered and activated by moving the chip 2 through a magnetic field.

[0027] The insole 1 is preferably made by a method comprising the following steps:

In a first step, the chip 2 is positioned in a mold or die for forming the insole 1. The position of the chip 2 in said mold or die may correspond to a position that defines the arch portion 4 of the insole 1.

In a second step, a material forming the body of said insole 1 such as ethylenvinylacetate (EVA), polyurethane (PU) and/or silicone is supplied to said mold or die in a liquid state, such that the chip 2 is fully buried by said material. The insole 1 is preferably made by casting, injection molding or foaming. For foaming, a foaming agent is preferably added to the material prior to the introduction into the mold or die.

In a third step, the material for forming the insole 1 is cured. As such, the chip 2 is embedded in the body of the insole 1 so as to become an inherent part of the insole 1.

In a fourth step, the insole 1 is tailored to its final shape and size by punching, stamping or cutting.

[0028] Fig. 2 is a perspective view of an insole 1 in accordance with a second embodiment of the present invention. In this embodiment, a receptacle 8 for a module 10 carrying an electronic chip 2 and a button-type battery 9 as an energy storage means for powering said chip 2 is defined between two adjacent layers 6, 7 of the insole 1 in an arch portion thereof. The chip 2 is embodied as a microprocessor and/or an active transponder. The battery 9 and the chip 2 are connected by means of flexible conductors. The insole 1 has a top side A and a bottom side B. In use, the top side A faces a foot of a user and the bottom side B faces a sole of a shoe furnished with the insole 1.

[0029] The insole 1 is preferably made by a method comprising the following steps:

In a first step, separate layers 6, 7 are made by foaming, casting or injection molding. A material forming the body of said insole 1 such as ethylenvinylacetate (EVA), polyurethane (PU) and/or silicone is supplied to different molds or dies for forming the layers 6, 7. Alternatively, an insole body can be made in one piece by foaming, casting or injection molding in a respective mold or die.

In a second step, a receptacle 8 is formed into the bottom layer 7 by punching, stamping or cutting.

In a third step, the module 10 comprising the chip 2 and the battery 9 is fitted into the receptacle 8 from the top side A of the insole 1, such that the module 10 completely fills, closes and seals the receptacle 8. When the module 10 is completely fitted into the receptacle 8, the surface of the module 10 is flushed with an adjacent surface of the bottom layer 7. That is, the module 10 and the receptacle 8 have complementary shapes, wherein the outer contour of the module 10 is adapted to the inner contour of the receptacle 8.

In a fourth step, the layers 6, 7 are laminated and adhesively connected, so that the module 10 is trapped between the layers 6, 7 and undetachably combined with the insole 1. The laminated layers 6, 7 provide a watertight environment for the module 10.

In a fifth step, the insole 1 is tailored to its final shape and size by punching, stamping or cutting.

[0030] Fig. 3 is a perspective view of a shoe 11 in accordance with the present invention.

[0031] The shoe 11 depicted in Fig. 3 is a sports shoe, in particular a running shoe. For ease of description, only the right shoe is described. The left shoe may be configured likewise in a symmetrical fashion. The shoe 11 comprises an opening 12 that receives a right foot of a user during use, a lining 13, a tongue 14, an instep 15 and a sole 16. A module 10 provided with an electronic chip 2 and a button-type battery 9 as an energy storage means for powering said chip 2 is detachably combined with said shoe 11, wherein the module 10 is inserted and removed through the opening 12. In this embodiment, the module 10 is received in a receptacle 8 provided in an insole 1, preferably in the insole 1 according to the second embodiment. However, the receptacle 8 may alternatively be provided in/on the lining 13, the tongue 14, the vamp 15 or the sole 16.

Claims

1. Insole (1), in particular for a sports shoe, **characterized by** said insole (1) comprising an electronic chip (2).

2. Insole (1) according to claim 1, **characterized by** said chip (2) is embodied as a microprocessor and/or an active and/or passive transponder chip.

3. Insole (1) according to one of the preceding claims,

characterized by said chip (2) is accommodated in a heel portion (3), in an arch portion (4) and/or in a ball portion (5) of said insole (1).

4. Insole (1) according to one of the preceding claims, **characterized by** a body of said insole (1) is made by foaming, casting, injection molding, laminating, punching, stamping and/or cutting, wherein said chip (2) is preferably integrally formed with or detachably combined with said insole body.

5. Insole (1) according to one of the preceding claims, **characterized by** said chip (2) is accommodated between different layers (6, 7) of said insole (1).

6. Insole (1) according to one of the preceding claims, **characterized by** said chip (2) or a module (10) comprising said chip (2) is received within a receptacle (8) of the insole (1).

7. Insole (1) according to one of the preceding claims, **characterized by** said receptacle (8) receives said chip (2) or module (10) comprising said chip (2) from a top side (A) from or a bottom side (B) of said insole (1).

8. Insole (1) according to one of the preceding claims, **characterized by** said chip (2) or module (10) comprising said chip (2) fits into said receptacle (8) such that it completely closes, fills and/or seals said receptacle (8), wherein the surface of chip (2) or module (10) is preferably flush with an adjacent surface of the insole (1).

9. Insole (1) according to one of the preceding claims, **characterized by** said chip (2) or module (10) comprising said chip (2) and an insole body are substantially made from the same material, preferably plastic, most preferably ethylenvinylacetate (EVA), polyurethane (PU) and/or silicone.

10. Insole (1) according to one of the preceding claims, **characterized by** said insole (1) comprising energy generation and/or storage means powering said chip (2), preferably a battery, most preferably a button type battery (9).

11. Insole (1) according to one of the preceding claims, **characterized by** said chip (2) and/or said energy generation means and/or said energy storage means is sealed in a watertight fashion.

12. Shoe (11), in particular sports shoe, comprising a module (10) provided with an electronic chip (2), wherein said module (10) is detachably combined with said shoe (11), **characterized by** said module (10) is inserted and removed through the opening (12) that receives a foot of a user of said shoe (11).

13. Shoe (11) according to claim 12, **characterized by** said module (10) can be received in a receptacle (8) of said shoe (11).

14. Shoe (11) according to claim 13, **characterized by** said receptacle (8) is provided on an insole (1), a lining (13), a tongue (14), an instep (15) or a sole (16) of said shoe (11).

15. Method of manufacturing an insole (1) comprising an electronic chip (2), wherein a body of said insole (1) is made by foaming, casting, injection molding, laminating, punching, stamping and/or cutting, wherein the chip (2) is integrally formed or detachably combined with with said insole body.

Amended claims in accordance with Rule 137(2) EPC.

1. Insole (1), in particular for a sports shoe, said insole (1) comprising an electronic chip (2), wherein said chip (2) is accommodated between different layers (6, 7) of said insole (1), wherein a module (10) comprising said chip (2) is received within a receptacle (8) in a heel portion (3) of the insole (1), **characterized by** said receptacle (8) receives said module (10) from a bottom side (B) of said insole (1), wherein said module (10) fits into said receptacle (8) such that it completely fills said receptacle (8).

2. Insole (1) according to claim 1, **characterized by** said chip (2) is embodied as a microprocessor and/or an active and/or passive transponder chip.

3. Insole (1) according to one of the preceding claims, **characterized by** a body of said insole (1) is made by foaming, casting, injection molding, laminating, punching, stamping and/or cutting, wherein said chip (2) is preferably integrally formed with or detachably combined with said insole body.

4. Insole (1) according to one of the preceding claims, **characterized by** the surface of chip (2) or module (10) is preferably flush with an adjacent surface of the insole (1).

5. Insole (1) according to one of the preceding claims, **characterized by** said chip (2) or module (10) comprising said chip (2) and an insole body are substantially made from the same material, preferably plastic, most preferably ethylenvinylacetate (EVA), polyurethane (PU) and/or silicone.

6. Insole (1) according to one of the preceding claims, **characterized by** said insole (1) comprising energy generation and/or storage means powering said chip (2), preferably a battery, most preferably a button

type battery (9).

7. Insole (1) according to one of the preceding claim, **characterized by** said chip (2) and/or said energy generation means and/or said energy storage means is sealed in a watertight fashion.

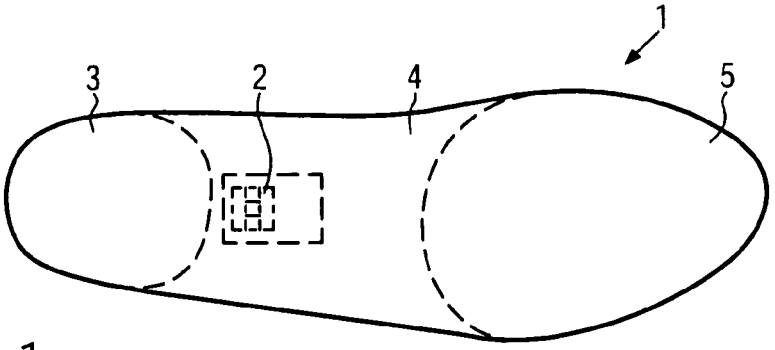

FIG. 1

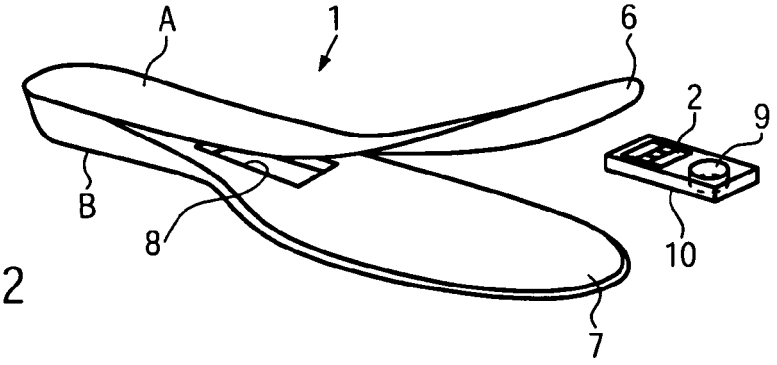

FIG. 2

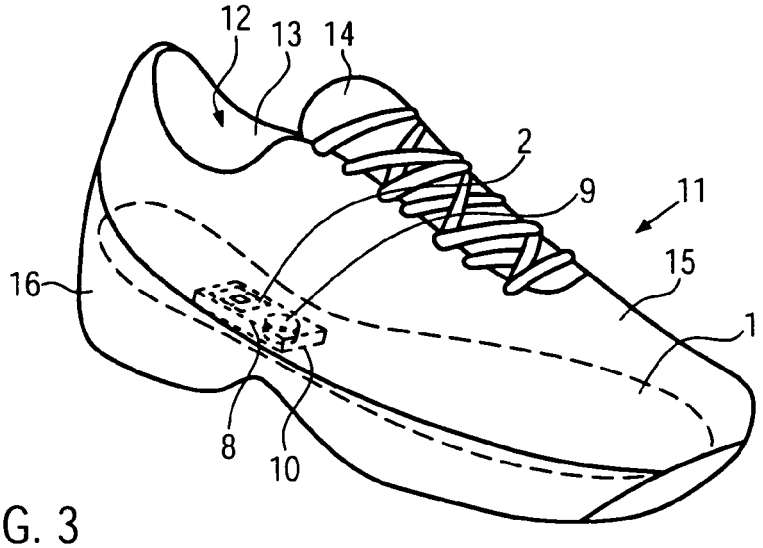

FIG. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 10 00 5748

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 2007/033838 A1 (LUCE NICOLA J [US] ET AL) 15 February 2007 (2007-02-15) * the whole document *	1-15	INV. A43B17/00
X	US 2007/260421 A1 (BERNER WILLIAM E JR [US] ET AL BERNER JR WILLIAM E [US] ET AL) 8 November 2007 (2007-11-08) * paragraphs [0076], [0079], [0093] - [0094], [0100]; figures 5A-C,6A-C *	1-15	
X	US 2005/261609 A1 (COLLINGS TIMOTHY D [CA] ET AL COLLINGS TIMOTHY DAVID [CA] ET AL) 24 November 2005 (2005-11-24) * paragraphs [0046] - [0049], [0063], [0073]; figures 1,7,10 *	1-6,9, 10,12-15	
X	US 2001/049890 A1 (HIRSCH JOHN [US] ET AL) 13 December 2001 (2001-12-13) * paragraphs [0018], [0019], [0048] - [0049]; figures *	1-5,9, 10,12-15	
X,D	DE 20 2004 012749 U1 (ILLIAN HOLGER) 14 October 2004 (2004-10-14) * paragraph [0013]; claim 4; figure 3 *	1-4,6,8, 9,12-15	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	22 November 2010	Vesin, Stéphane

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)

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Application Number
EP 10 00 5748

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☒ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 10 00 5748

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-11, 15

   Removable insole with an electronic chip

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2. claims: 12-14

   Shoe with a module provided with an electronic chip

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 10 00 5748

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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22-11-2010

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007033838 A1	15-02-2007	WO 2007022262 A2	22-02-2007
US 2007260421 A1	08-11-2007	CN 101479572 A	08-07-2009
		EP 2021735 A2	11-02-2009
		JP 2009535157 T	01-10-2009
		US 2010037489 A1	18-02-2010
		WO 2007130287 A2	15-11-2007
US 2005261609 A1	24-11-2005	CA 2567666 A1	08-12-2005
		WO 2005116951 A1	08-12-2005
US 2001049890 A1	13-12-2001	NONE	
DE 202004012749 U1	14-10-2004	NONE	

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 202004012749 A1 **[0003]**
- FR 2855725 A **[0004]**