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(54) **FOOTWEAR ITEM COMPRISING A BIOCIDAL PRODUCT AND METHOD FOR INCORPORATING SAID BIOCIDAL PRODUCT**

(57) The invention relates to a footwear item comprising a biocidal product, having a sole and an upper, and comprising a biocidal product composition located in a part of the footwear item selected from the sole and an insole. According to the invention, with each step the

pressure of the user's foot releases a portion of the biocidal product located in the region of the footwear item, said biocidal product acting as an effective and efficient insect repellent.

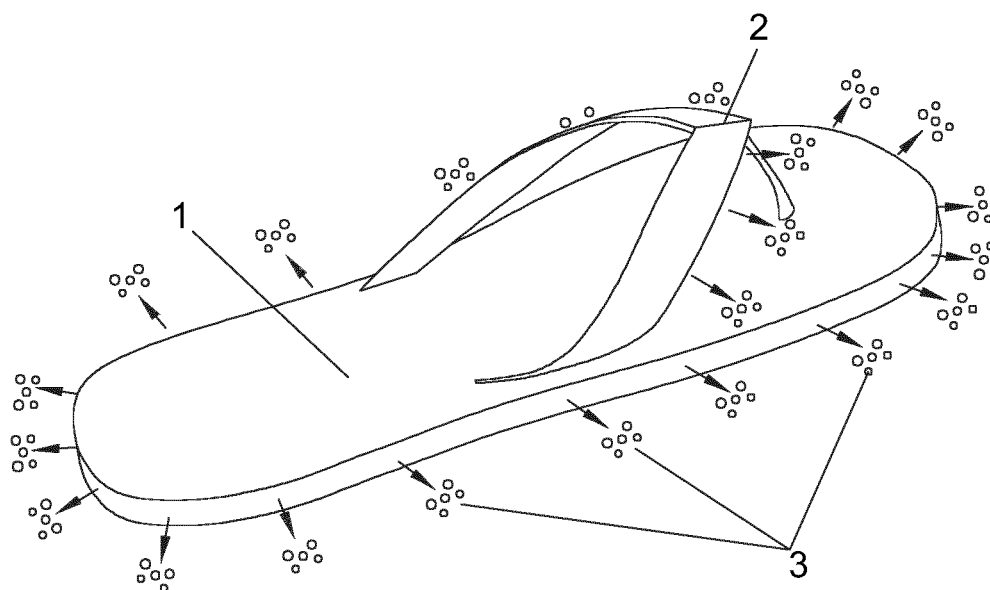


FIG. 1

Description

OBJECT OF THE INVENTION

[0001] The invention, as expressed in the title of this description, refers to a footwear item comprising a biocidal product and a method for incorporating said biocidal product in said footwear item.

[0002] The goal is to integrate in different formats of various types of footwear items one or several insect repellent substances, especially natural products, in the area of the foot and the leg, which are released gradually and are based on the technology of microencapsulation with biopolymers, in order to repel insects and protect the user from insect bites in general, especially from mosquitoes and phlebotominae, and in particular from the endemic disease vectors they transmit.

[0003] Therefore, the specific technical goals are:

- To create an efficient insect repellent product that can provide real protection, backed by efficiency tests in authorised testing centres. This protection affects both the area of the feet and the legs, and the entire body of the user in general.
- To attain one or several types of footwear items, taking into account the different markets and countries where the product can be sold, in which the active insect repellent and/or biocide ingredients can be incorporated.

[0004] This results in a safe, environmentally friendly and affordable product for the whole population.

[0005] Therefore, the footwear item that is the object of the invention will have an insect repellent and/or biocide effect both on the area around the foot as well as an insect repellent and/or biocide effect in the entire perimeter of the body of the user, and not only on the lower limbs.

BACKGROUND OF THE INVENTION

[0006] One of the recommendations of international health organisations in order to avoid contracting vector-borne diseases is to apply insect repellent products on the body. These products, which usually come in the form of lotions, must be applied every four or six hours depending on the type of product and the concentration of the active substance they contain. This results in users having to pay constant attention to applying the products, and in some parts of the world insect repellent products may not be readily available or affordable, especially if the local population has very little means.

[0007] Additionally, a very important part of the body is generally overlooked when these insect repellent products are applied, which are the feet and especially the ankles where the epidermis is thinner and therefore a very appealing area for mosquitoes and, most of all, for phlebotominae that have a very short and low flight, and

that prefer those areas to get the blood they need to hatch their eggs.

[0008] Mosquitoes transmit diseases like malaria, dengue, yellow fever, West Nile virus and several encephalitides. Phlebotominae are vectors of cutaneous and visceral leishmaniasis.

[0009] The new technology of microencapsulation with polymers is able to incorporate different active principles such as conventional biocides, insect growth regulators, repellents, attractants, natural molecules (essential oils) in slow release biopolymers that have a strong residual power by preventing the active ingredients from interacting.

[0010] Microencapsulation with polymers of active ingredients is carried out in an organic polymer incorporated in an active matrix of different fillers and pigments, which provides slow and gradual release of the active ingredients, thus increasing their duration, and which are also harmless to humans.

[0011] Every formulation of microencapsulation with polymers incorporates a microcapsule, since this is the component that provides each formula with its special characteristics.

[0012] Microcapsules are created using a chemical process that results in a suspension of microcapsules between 1 nanometre and 300 micrometres.

[0013] For example, this type of microencapsulation is described in the patents for the inventions with publication numbers WO 2010130856 and ES 2350075, both of which belong to the same owner of the invention being disclosed.

[0014] The gradual and controlled release of the active microcapsules is achieved thanks to the nature of the polymer that coats them.

[0015] The main benefits of the new microcapsule products for the control of vector-borne diseases are:

- Increased efficiency.
- Safety for the user and the environment, since they are based on natural and non toxic substances.
- Long active protection by means of the slow-release of the active ingredients thanks to microencapsulation with polymers.
- Lack of toxic residues, which results in savings and simplifying the handling and reuse of the materials.
- Classified as an eco-friendly product, which can therefore be used in any part of the world.

DESCRIPTION OF THE INVENTION

[0016] The footwear item comprising a biocidal product that is the object of the invention has a sole and an upper, and comprises a typical microencapsulated composition of a biocidal product located in a part of the footwear item selected in between the sole and an insole.

[0017] The biocidal product composition does not necessarily have to be microencapsulated.

[0018] With each step the pressure of the user's foot

releases a portion of the biocidal product located in the region with the microcapsules.

[0019] In one embodiment, the microcapsules are located in the area corresponding to the front part of the user's foot.

[0020] In a second embodiment, the microencapsulation is located in a second area corresponding to the back part of the user's foot, which coincides with the heel.

[0021] In a third embodiment, the microencapsulation is located both in the first area corresponding to the front part of the user's foot as well as in a second area corresponding to the back part of the user's foot, which coincides with the heel as has been mentioned above.

[0022] In a fourth embodiment, the microencapsulation containing the insect repellent product is located on the entire surface of the sole of the user's foot.

[0023] In a fifth embodiment, the microencapsulated composition is located at least in a part of the outer surface of the sole.

[0024] In a sixth embodiment, the microencapsulated composition is located at least in a part of the insole.

[0025] In a seventh embodiment, the microencapsulated composition of the biocidal product is located at least in a part of the outer surface of the sole and a part of the insole.

[0026] In an eighth embodiment, the microencapsulated composition of the biocidal product is integrated in at least an area of a layer of the adhesive material used to glue together the insole and the sole of the footwear item.

[0027] In one of the embodiments the layer of adhesive material is integrated in the insole itself, whilst in another alternative embodiment the layer of adhesive material is an independent component that is applied when the insole and the sole of the footwear item are glued together.

[0028] The method to incorporate the insecticide product comprises:

A first phase of coating the microencapsulated insecticide product on at least one part of the footwear item selected between the sole and the insole, and a second phase of curing and drying the microcapsule insecticide product applied on the corresponding footwear item.

[0029] When the microencapsulated composition of the biocidal product is incorporated in the adhesive material, the method comprises a first phase in which the microcapsule composition of the biocidal product is integrated in the layer of adhesive material that would glue the insole and the sole together, and a second phase where the microencapsulated biocidal product applied to the adhesive material is cured and dried.

[0030] Therefore, the footwear item that is the object of the invention achieves effective protection of an area of the human body (the region of the ankles and legs) that is very prone to bites, without having to continuously apply insect repelling products.

[0031] The footwear item that is the object of the in-

vention will have an insect repellent and/or biocidal effect both in the area around the foot as well as an insect repellent and/or biocidal effect in the entire perimeter of the body of the user, and not only on the lower limbs.

[0032] The system used to release the active ingredients incorporated in the footwear item is based on microencapsulation with biopolymers. This process guarantees a slow and gradual release of the active components, guaranteeing persistence throughout the lifespan of the footwear item.

[0033] It is worth noting that this technology is being used with other active components and incorporated in paints, achieving very good results controlling Chagas disease in South America and malaria in Africa.

[0034] Overall, the invention aims to create a system to incorporate one or several active biocidal ingredients (insecticide and/or repellent) in different types of footwear items. The nature, composition, properties and quantity of these active ingredients will vary depending on the type of footwear item and its use.

[0035] The footwear item that is the object of the invention achieves the following goals:

- It incorporates the microencapsulated actives in the footwear item so that it achieves a controlled and slow release over time.
- It creates a final product that is harmless to the user.
- It creates a product that lasts at least throughout the lifespan of the footwear item, or it incorporates a system to reactive it.
- It creates a method to activate the emission of the active ingredient (movement, heat, others...)
- It achieves total integration with the process of manufacturing the footwear item, which would allow this technology to be incorporated by the main companies of the footwear industry at their assembly lines in an easy and quick way.
- It creates a product that is adapted to the different types of footwear according to the problems or the needs of each final user.

[0036] Microencapsulation will contain different kinds of active ingredients with insect repellent properties, in particular with properties to repel diptera (mosquitoes and phlebotominae).

[0037] It will especially focus on natural products or on those proven to be harmless to the final user.

[0038] The safety of the product will be guaranteed not only by the properties of the active ingredient used, but also by the properties of the microencapsulation process of said ingredient by means of microencapsulation technology, which drastically reduces the toxicity (if there was any) of the active ingredient.

[0039] The technology solutions employed during the different stages of development of the footwear item with the biocidal product represent innovations in the field of insect control and prevention of diseases transmitted by insects.

[0040] The technological innovations lie mainly in the process of incorporating the active ingredient in the different materials used in manufacturing the footwear item, in the process of releasing said ingredient when the system is activated in order to release it.

[0041] Hereinafter, in order to ensure a better understanding of the present description, the object of the invention has been detailed in a series of drawings that are an integral part of said description and are included for illustrative purposes and should not be construed as limiting said invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042]

Figure 1.- Shows a perspective view of a footwear item comprising a biocidal product that is the object of the invention.

Figure 2.- Shows a plan view of what has been represented in the previous figure.

Figure 3.- Shows a view of the footwear item that incorporates an insole that is glued together with the sole of the footwear item by means of an adhesive material.

DESCRIPTION OF A SAMPLE EMBODIMENT

[0043] Considering the numbering adopted for the figures, the footwear item comprising a biocidal product features a biocidal product composition 3 on a part of the footwear, either on the sole 1 of the footwear or on an insole 4, with the aim of achieving a gradual and controlled release of the biocidal product 3, such as an insecticide.

[0044] In one of the embodiments, the footwear item comprises a sole 1 and an upper 2. In another embodiment, the footwear item also incorporates an insole 4 that rests on the sole 1.

[0045] In another embodiment, as shown on figure 3, the insole 4 is glued together with the sole 1 by means of a layer of adhesive material 5 incorporated on the insole 4 as the first option, and as a second option the insole is glued to the sole by means of a layer of adhesive material 5 that is applied when the two components are fitted together.

[0046] The biocidal composition 3 is well-known, and therefore it is not the object of the invention.

[0047] In one of the embodiments, said biocidal composition 3 is a microencapsulated composition as the one described, for example, in the patents mentioned in the background of the invention:

Publication number WO 2010130856 and publication number ES 200930147, both of which belong to the same owner of the invention being disclosed.

[0048] Therefore, part of the footwear item, preferably

the sole, can incorporate a layer of the same material that the one that composed the sole of the footwear item, "loaded" or not with the microencapsulated composition.

[0049] This means that the load of the biocidal composition 3 is located in a part of the footwear item so that said composition achieves a sustained release over time.

[0050] In order to achieve this, it is foreseen that with each step the user applies the weight of his/her body to exert pressure on the footwear item and thus release the biocidal composition.

[0051] Basically, two methods are foreseen to manufacture the object of the invention:

A first method in which at least part of the polymer material comprising the sole of the footwear item is covered or coated with the biocidal composition 3 in order to completely coat said sole, which will later release the biocidal product over time.

[0052] Additionally, there is a phase of curing and drying the material.

[0053] A second method where the biocidal composition 3 (biocidal actives) is integrated in the layer of adhesive material 5 used to glue together the insole 4 with the sole 1 of the footwear item.

[0054] In this case, the composition may comprise an adhesive as the ones listed below:

- Latex adhesives: vinyl latex or polyvinyl alcohol.
- Pressure sensitive adhesives: silicone, acrylic and rubber.
- Hot melt adhesives: thermoplastics.
- Reactive adhesives.
- Elastomers: Styrene-butadiene rubber (SBR) or neoprene.
- Other types of adhesives: epoxy (epoxy resin plus hardener), silicones, phenolics, polyimides, plastisols (modified PVC), polyester, polyvinyl acetate and polyacrylates, acrylates and methacrylates, cyanoacrylates, phenolics.
- Natural adhesives: collagen stickers, starches, caffeine, resins (rosin) and natural gums (lacquer, gum Arabic).

[0055] As explained above, it is foreseen that some biocidal compositions may not be microencapsulated and therefore will only be coated or soaked on the body of the footwear item itself, microencapsulation not being necessary.

[0056] Additionally, there is the option of reactivating the biocidal compound that coats the footwear item with the aim of extending the repellent and/or biocidal effect of the footwear item, especially on "high end" footwear items such as specialised shoes, mountain shoes, military boots, etc.

[0057] It is worth noting that the footwear item that is the object of the invention is not only a sandal, as shown in the figures, but it can be any kind of footwear item.

Claims

1. A footwear item comprising a biocidal product, having at least a sole and an upper; **characterised in that** it comprises a biocidal product composition (3) located in a part of the footwear item selected in between a sole (1) and an insole (4); where with each step the pressure of the user's foot releases a portion of the biocidal product located in the region of the footwear item. 5
2. A footwear item comprising a biocidal product, according to claim 1, **characterised in that** the biocidal composition (3) is located in the area corresponding to the front part of the user's foot. 10
3. A footwear item comprising a biocidal product, according to claim 1, **characterised in that** the biocidal composition (3) is located in the area corresponding to the back part of the user's foot, which coincides with the heel. 15
4. A footwear item comprising a biocidal product, according to claim 1, **characterised in that** the biocidal composition (3) is located in the area corresponding to the front part of the user's foot as well as in a second area corresponding to the back part of the user's foot, which coincides with the heel. 20
5. A footwear item comprising a biocidal product, according to claim 1, **characterised in that** the biocidal composition (3) is located in the area corresponding to the entire surface of the sole of the user's foot. 25
6. A footwear item comprising a biocidal product, as claimed in any one of the previous claims, **characterised in that** the biocidal composition (3) is located at least in a part of the outer surface of the sole (1). 30
7. A footwear item comprising a biocidal product, as claimed in any one of the claims 1 to 5, **characterised in that** the biocidal composition (3) is located at least in a part of the insole (4). 35
8. A footwear item comprising a biocidal product, as claimed in any one of the claims 1 to 5, **characterised in that** the biocidal composition (3) is located at least in a part of the outer surface of the sole (1) and a part of the insole (4). 40
9. A footwear item comprising a biocidal product, as claimed in any one of the previous claims, **characterised in that** the biocidal composition (3) is integrated at least in an area of a layer of the adhesive material (5) used to glue together the insole (3) and the sole (1) of the footwear item. 45
10. A footwear item comprising a biocidal product, according to claim 9, **characterised in that** the layer of adhesive material (5) is integrated in the insole (4) itself. 50
11. A footwear item comprising a biocidal product, according to claim 9, **characterised in that** the adhesive material (5) is an independent element. 55
12. A footwear item comprising a biocidal product, as claimed in any one of the previous claims, **characterised in that** the biocidal composition (3) is a microencapsulated composition.
13. A method for incorporating the biocidal product, as claimed in any one of the previous claims, **characterised in that** it comprises the following phases:
 - a first phase of coating the biocidal product composition (3) on at least a part of the footwear item selected in between the sole (1) and the insole (2);
 - a second phase of curing and drying the biocidal product composition (3) applied to the part of the footwear item in the first phase.
14. A method for incorporating the biocidal product, as claimed in any one of the claims 9 to 12, **characterised in that** it comprises the following phases:
 - a first phase in which the biocidal product composition (3) is integrated in the layer of adhesive material (5) glueing the insole (4) and the sole (1) together.
 - a second phase of curing and drying the biocidal product composition (3) applied in the first phase.

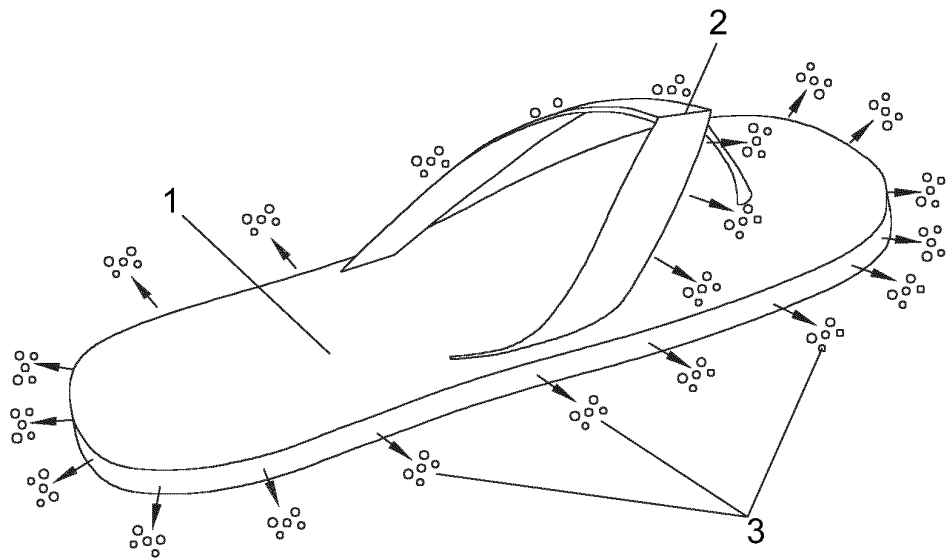


FIG. 1

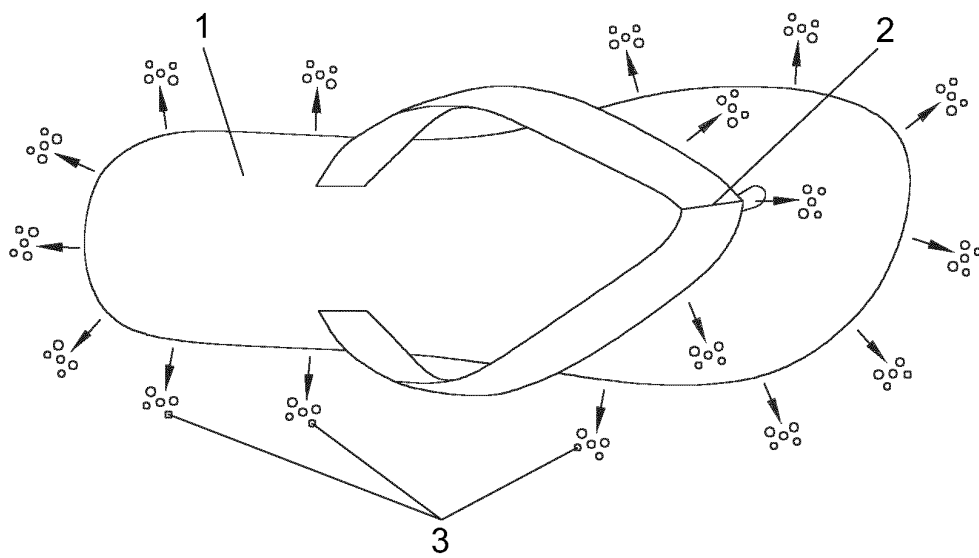


FIG. 2

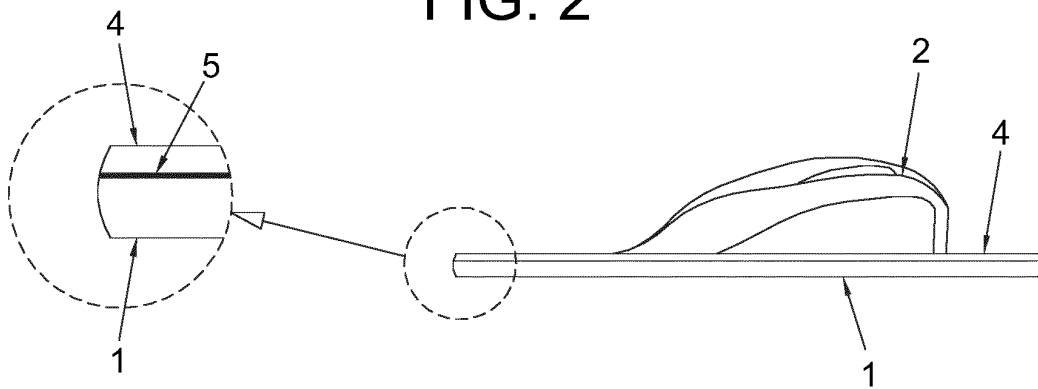


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2014/070138

A. CLASSIFICATION OF SUBJECT MATTER

A43B7/00 (2006.01)

A61K9/16 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A43B, A61K9/16, A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC, INVENES, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search
30/05/2014Date of mailing of the international search report
(02/06/2014)

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2014/070138

C (continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	
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Form PCT/ISA/210 (continuation of second sheet) (July 2009)

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International application No.

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