

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
19 April 2007 (19.04.2007)

PCT

(10) International Publication Number
WO 2007/042971 A2

(51) International Patent Classification:

A43B 13/18 (2006.01) A43B 3/24 (2006.01)
A43B 13/20 (2006.01)

(21) International Application Number:

PCT/IB2006/053634

(22) International Filing Date: 4 October 2006 (04.10.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

01634/05	10 October 2005 (10.10.2005)	CH
00153/06	30 January 2006 (30.01.2006)	CH
01531/06	26 September 2006 (26.09.2006)	CH

(71) Applicant (for all designated States except US): **KAMRO ENGINEERING AG** [CH/CH]; Schulweg 4, CH-9325 Roggwil (CH).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **MÜLLER, Karl** [CH/CH]; Schulweg 4, CH-9325 Roggwil (CH).

MÜLLER, Matthias [CH/CH]; Schulweg 4, CH-9325 Roggwil (CH).

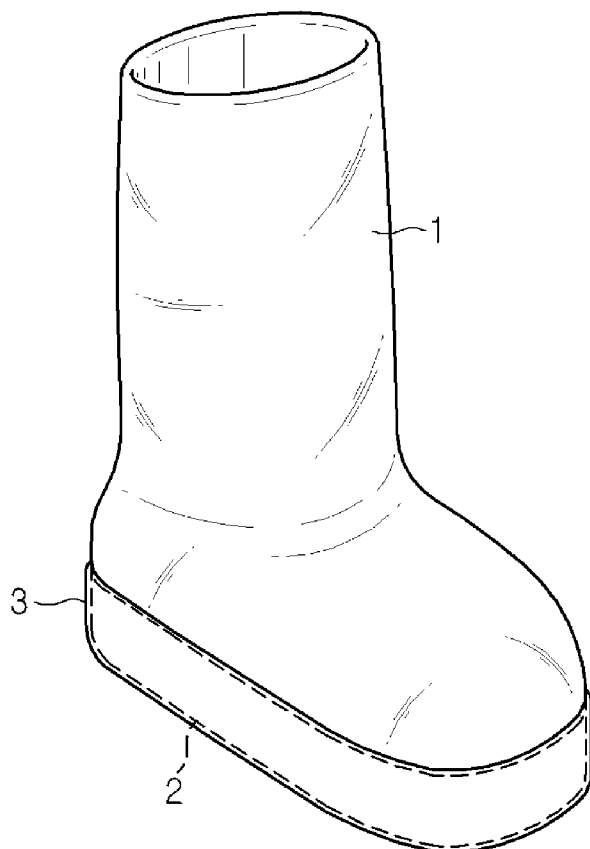
(74) Agent: **INDUSTRIEBERATUNG MAIER AG**; Gewerbestrasse 10, CH-4450 Sissach (CH).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT,

[Continued on next page]

(54) Title: FOOTWEAR AS MAT-SOCKS



(57) Abstract: The present invention relates to functional footwear of a new concept, which adapts itself to the shape of a foot and gives a soft feeling when walking. The footwear includes: an upper foot fixing section for covering and fixing an upper portion of a foot; and a foot supporting section attached to the upper foot fixing section for supporting a lower portion of the foot. The foot supporting section includes a resilient mat having a soft elastic body, which can be deformed according to the shape of the foot. The footwear has a simple structure and can give a feeling of walking barefoot on a sponge mat or on a lawn like a soft carpet to provide complete comfort to the wearer during walking.

WO 2007/042971 A2



RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

Published:

— *without international search report and to be republished upon receipt of that report*

FOOTWEAR AS MAT-SOCKS

BACKGROUND OF THE INVENTION

5 Field of the Invention

The present invention relates to functional footwear of a new concept, which adapts itself to the shape of a foot and gives a soft feeling when walking.

10 Description of the Prior Art

Examples of general footwear are shoes and socks.

The structure of a general shoe has been variously developed according to the usage thereof. The general shoe includes an upper part, covering the top portion of a foot and
15 maintaining the appearance and shape of the shoe, and a sole. In the sole, an outsole making contact with the ground, a midsole positioned between the outsole and a texion, a texion formed of a hard material for maintaining the appearance of the shoe and functioning as a connection portion between the upper
20 part and the sole, and an insole for hiding waste threads, tacks, and nails are sequentially stacked.

Further, a general sock, especially an ankle sock, includes an upper portion covering a top portion of a foot and a bottom portion surrounding the bottom of the foot.

25 In relation to the feeling when walking, a shoe for

absorbing an impact due to the weight of a wearer during walking or exercise, by inserting a elastic body into the portion between the texion and the outsole or forming a midsole out of a elastic material, has been suggested. However, in the structure of the conventional shoe, since the texion cannot be made of a soft and elastic material but can be made only of a hard material in order to function as a connecting portion of the upper and the sole, to maintain the shape of the shoe, and to fix the midsole or the elastic body inserted into the midsole, there has been a limit in obtaining a sufficiently soft touch in the aspect of the feeling when walking with which the shoe adapts itself to the shape of the foot.

In the conventional shoe, the problem of the hard texion has been supplemented by generally using an insole. However, even in this case, since the shoe has a hard texion at a lower portion of the insole, there also has been a limit in obtaining a sufficiently soft touch in the aspect of the feeling when walking.

In the case of an ankle sock, there has been an effort to lessen the partial impact and to improve the wearing feeling by using double woven fabrics at the bottom portion thereof. However, since the ankle sock assumes the wearing function of a shoe, there still has been a limit in obtaining a sufficiently soft touch in the aspect of the feeling when walking with which the sock adapts itself to the shape of the foot.

In the case of a functional shoe used for orthopedic objects such as form correction, improvement or prevention of muscular skeleton problems, and assistance of rehabilitation, and for exercises of predetermined portions such as
5 reinforcement of predetermined muscles, the objects are generally accomplished by an insole of a shoe.

Further, European Patent Nos. 0999764 and 1124462 disclose functional shoes for the orthopedic objects and for exercises of predetermined portions of the human body.

10 In the patents, a shape including a hard-soft-transition portion is defined between the foot and the ground surface. As a result, a rolling process is compulsorily performed, reliant upon the desired type during walking or additional load is applied to a predetermined muscle(s) when walking such that the
15 shoe corresponds to a predetermined object(s) necessary for a wearer of a shoe.

Further, the above-mentioned shoe has the object of simulating the feeling of walking, for example, on non-flat surfaces such as a sandy plain, forest soil, or a pasture,
20 while being used on a flat surface such as an asphalt road, a concrete, or a plate bottom..

However, since the above-mentioned functional shoe includes a hard texion or a separate hard structure for maintaining the appearance of the shoe, there has been a limit
25 in obtaining a sufficiently soft touch in the aspect of the

feeling when walking with which the shoe adapts itself to the shape of the foot.

Further, since the functional shoe works as a compulsory therapy demanding a predetermined walking method and a
5 predetermined posture to a wearer, the wearer should maintain the balance using the required locomotive organs such as muscles and skeletons. The walking method or the regulation of the walking posture is determined by the use of a hard or soft insertion material having a bottom structure of a predetermined
10 shape. An orthopedist deliberately determines how the wearer should act and which attitude the wearer should take and accordingly the predetermined shape of the bottom structure is determined.

However, the predetermined shape of the bottom structure
15 can be unsuitable for individual symptoms and have a danger of demanding wrong posture over a long period of time due to an unsuitable diagnosis of an orthopedist.

In the conventional shoes used for functions, it is often necessary for the shoes to adapt themselves to the individual
20 walking methods and the individual structures of a locomotive organs in order to have an excellent effect for the orthopedic objects or the exercises for predetermined portions. However, in general, as well as if a wearer selects a wrong structure or an orthopedist makes an inaccurate diagnosis, the functional
25 shoes are not comfortable when the shoes are initially worn,

are difficult to wear, and can cause a complete inconvenience at the worst. Such a situation arises when wearers need to adapt themselves to the shoes.

Not only do the wearers adjust themselves to the shoe but
5 also the shoe adapt itself to the shape of the wearer's foot and the walking methods of the wearers in the shoes and the texions, which are manufactured of leather or cloth by a simple method.

However, fiber, plastic, and rubber , currently used as
10 synthetic materials, have a basic limit in adapting the soft materials to the foot of the wearer due to their characteristics and the structures of the above-mentioned shoes.

Further, it has been studied and proved experimentally
15 that giving comfortableness to the feet of a wearer and allowing the maximum degree of freedom has an orthopedic healing effect by the motion sequence of the wearer. This has a thread of connection with a report stating that people from the countryside that walk barefoot on soft natural ground
20 maintain locomotive organs far fitter than city dwellers wearing standardized shoes.

Therefore, it is necessary to develop a footwear of a new concept which adapts itself to the wearer to provide complete comfortableness during walking and allows the maximum degree of
25 freedom to a foot even if some or all of the structures for

maintaining the appearance of the footwear are abandoned.

SUMMARY OF THE INVENTION

5 Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the prior art, and an object of the present invention is to provide footwear which has a simple structure and can give a feeling of walking barefoot on a sponge mat or on a lawn like a soft carpet to
10 provide complete comfortableness to the wearer during walking.

It is another object of the present invention to provide footwear that can easily change the wearing feeling and the correction function during walking if necessary.

It is still another object of the present invention to
15 provide footwear that gives complete comfortableness to the wearer during walking and allows the maximum degree of freedom to the foot.

In order to achieve the above-mentioned objects, there is provided footwear comprising an upper foot fixing section for
20 covering and fixing the upper portion of a foot, and a foot supporting section attached to the upper foot fixing section for supporting the lower portion of the foot, of which the foot supporting section includes a resilient mat having a soft elastic body which can be deformed according to the shape of
25 the foot.

A conventional shoe essentially includes a hard texion or a hard structure for maintaining the appearance thereof, but the present invention does not include a hard texion or a separate structure for maintaining the appearance of a shoe in
5 order to improve the feeling when walking.

In accordance with the present invention, in spite of partially abandoning the aspect of maintaining the appearance of a shoe, the present invention not only has a relatively simple structure and can give a feeling of walking barefoot on
10 a sponge mat or on a lawn like a soft carpet to provide complete comfortableness to the wearer during walking but also can give the maximum degree of freedom to a foot by adapting a contact portion with the foot to the shape of the bottom of the foot.

15 Preferably, the foot supporting section further includes a shroud covering a portion or all portions of the outer surface of the soft resilient mat and fixing the soft resilient mat.

According to the structure, the resilient mat formed of a elastic body can be protected and easily received and fixed and
20 the resilient mat (a elastic body received in a chamber in the case in which the shroud forms the chamber) can be exchanged, with the appearance of the footwear having the upper foot fixing section and a shroud maintaining the original shape.

Preferably, the foot supporting section includes a bottom
25 portion formed on the outer surface of the shroud for

preventing slide movement of the footwear when the footwear makes contact with the ground. The bottom portion is integrally formed with the shroud by forming the ground contact portion of the shroud thicker than the other portions. or is separately
5 formed and bonded. Also, the bottom portion can be formed by coating at least a portion of the ground contact portion of the shroud.

Preferably, a portion for inserting and withdrawing the resilient mat is formed on the surface of the shroud.

10 According to the structure, only the resilient mat can be easily inserted and withdrawn without separating the foot supporting section from the upper foot fixing section.

More preferably, the shroud is detachably attached to the foot fixing section so that the foot supporting section can be
15 attached to the foot fixing section.

According to the structure, the foot supporting section can be attached to the foot fixing section in various methods without any restriction in the type and shape of the resilient mat only by partially deforming the shroud and the upper foot
20 fixing section to provide an engagement portion, and the foot supporting section can be attached and detached, and the soft resilient mat inside the shroud can be exchanged if necessary. The attachment of the shroud to the resilient mat is not limited to above mentioned detachable attachment to the foot
25 fixing section, and the shroud can be integrally formed with

the resilient mat or can be separately formed and firmly attached to the resilient mat by bonding, etc.

Further, as mentioned above, the shroud can have a portion which can be opened and closed and can be used for inserting
5 and withdrawing the resilient mat to exchange the resilient mat without separating the entire shroud from the upper foot fixing section.

Preferably, the shroud includes at least one chamber for receiving the elastic body.

10 Accordingly, by receiving the elastic bodies having various elastic properties into the chambers, the elastic bodies can provide the feeling when walking suitable for the requirements of the wearer and can be exchanged to easily change the elastic properties according to the foot contact
15 portions.

Preferably, the resilient mat is divided into a plurality of divisions each of which includes a elastic body.

According to the structure, the wearing feeling and the correction function during walking can be modified to meet the
20 requirements of the wearer by regulating the shape and/or material of the divisions.

Further, the elastic body uses an opened elastic body, a closed elastic body, or both of them.

Here, the opened elastic body refers to a elastic body for
25 example, a foam material or structure made of a sponge, rubber

or a natural/synthetic resin which contains air inside itself or its structure, having a property of elasticity in the method of discharging air by applying a pressure and pressing the elastic body and recharging air by decreasing the pressure, .

5 In the case of forming a resilient mat including the opened elastic body, if the elastic body is compressed, the air existing in a middle space of the material or structure can be transferred into the interior of the upper foot fixing section, the foot of the wearer reaches a ventilation state due to the
10 air-flow generated during pressing and expansion of the air as well as get a soft feeling when walking due to the elastic body. , .

The closed elastic body refers to a elastic body for example, a filled body having the shape of a closed bag which
15 is filled with a filling material such as air, a fluid, and a gel or a rubber with a property of elasticity of which only the shape can be changed by applying a pressure while the air or filling material is not introduced or discharged. The bag-shaped filling body is provided with a valve (not shown) so that the
20 property of elasticity can be varied, if necessary, by discharging or refilling the filling material inside thereof.

Preferably, the resilient mat is divided into an upper portion including at least one opened elastic body and a lower portion including a closed elastic body.

25 By the dual structure of the resilient mat, the lower

portion provides a property of elasticity relatively stable,
and the upper portion uses the opened elastic body so that the
ventilation property of the footwear can be improved during the
time of walking by using the air generated while the resilient
5 mat is loosened and contracted.

More preferably, the elastic body forming the resilient
mat includes hard elastic particles inside.

According to the structure, the elastic particles inside
of the soft elastic body can function as a buffer which
10 alleviates the phenomenon that the soft elastic body is
rapidly pressed when the footwear is worn and prevents the
feeling of the hard ground from being transferred to the foot
when the soft elastic body is compressed most. Further, the
feeling of wearing the footwear or the feeling when walking can
15 be regulated by regulating the number, size, and type of the
hard elastic particles inserted when the elastic body is
manufactured, thereby regulating the compression degree and the
maximum compression thickness.

Preferably, the present invention includes a bottom
20 portion attached to the outer surface of the foot supporting
section in order to protect the foot supporting section
including the resilient mat and to prevent slide movement while
making contact with the ground.

The bottom portion can be formed only in the ground
25 contact portion but is not limited thereto. The bottom portion

extends and covers at least one of the front, rear, right, and left sides of the foot in order to engage the foot supporting section with the upper foot fixing section additionally or extends in order to fix a portion or all of the foot
5 additionally.

Further, the upper foot fixing section is formed of a soft material and has the shape of a sock. The soft material includes a natural or synthetic fiber as in a general sock and any material flexible enough to attach or detach the footwear
10 such as natural or synthetic latex and a synthetic resin.

Since the upper foot fixing section has the shape of a general sock, it can be easily attached or detached and can maximize the wearing feeling and the soft feeling when walking as compared with a conventional shoe.

15 Preferably, the upper foot fixing section has the shape of a sock of a textile material and is attached to the shroud at the upper end portion of the foot to be integrally formed with the shroud. In this case, the shroud can be attached by various methods such as sewing, bonding, etc. Especially in case that
20 the material of the shroud is the same one of the upper foot fixing section, the shroud can be integrally formed with the upper foot fixing section by weaving or can be separately manufactured and then attached to the upper foot fixing section by sewing etc. so as to have the shape of a dual sock having a
25 reception space at the lower end thereof.

More preferably, a portion of the engagement portion of the upper foot fixing section and the shroud can be opened and closed to withdraw and exchange the resilient mat. Further, the shape of the upper foot fixing section is not limited to that of a sock and can be applied to various shapes of shoes, sandals, etc.

BRIEF DESCRIPTION OF THE DRAWINGS

10 The above and other objects, features and advantages of the present invention will be more apparent from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view showing the first preferred embodiment of footwear of the present invention;

FIG. 2 is a perspective view showing the second preferred embodiment of footwear of the present invention;

FIG. 3 is a perspective view showing the third preferred embodiment of footwear of the present invention;

20 FIG. 4 is a perspective view showing the fourth preferred embodiment of footwear of the present invention;

FIGs. 5a to 5f are views showing the engagement structures of the upper foot fixing section and the foot supporting section of the present invention;

25 FIGs. 6a to 6g are views for explaining methods to form a

foot supporting section according to the structures and formation methods of a resilient mat, a shroud, and a bottom portion of the present invention;

FIGs. 7a and 7b are perspective views showing preferred
5 embodiments of the cases in which a resilient mat is divided;

FIGs. 8a and 8b are views showing the structures of the shroud in the cases in which resilient bodies are inserted into chambers formed by dividing the resilient mat; and

FIGs. 9 and 10 are views for explaining the compression
10 rate relation when footwear of the present invention is worn, before and after an insertion material is inserted into the elastic body of the resilient mat.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

15

Hereinafter, preferred embodiments of the present invention will be described in detail with reference to the accompanying drawings. For reference, the same elements are indicated by the same reference numerals in the drawings.

20 FIG. 1 is a view showing a preferred embodiment of footwear according to the present invention. Basically, the footwear of the present invention includes an upper foot fixing section 1 for covering and fixing an upper portion of a foot and a foot supporting section attached to the upper foot fixing
25 section for supporting the lower portion of the foot. In the

preferred embodiment of the present invention, the foot supporting section includes a soft resilient mat 2 which can be deformed according to the shape of the bottom of the foot, a shroud 3 integrally formed with the resilient mat 2 or
5 separately attached to the resilient mat 2 for fixing the resilient mat 2, and a bottom portion (not shown) formed on the ground contact surface for preventing slide movement of the footwear.

As can be understood in the preferred embodiment, since
10 the present invention does not include a hard texion and a separate part to maintain the appearance of the footwear, different from a general shoe, the feel of the soft resilient mat 2 is transferred to the foot as it is during the time of walking, and thus the wearer feels the comfortableness of
15 walking barefoot on a soft sponge, a carpet, or a lawn.

Further, the bottom portion (not shown) for preventing the slide movement of the ground contact surface of the foot supporting section can be selectively formed. The bottom portion can be omitted if unnecessary according to the material
20 and shape of the resilient mat 2 or the place in which the footwear is used. In case that the bottom portion is omitted, the resilient mat 2 alone forms the foot supporting section. Further, in the case that the shroud 3 is applied to the footwear according to the present invention, the bottom portion
25 can be integrally formed with the shroud when the shroud is

formed or can be separately attached to the ground contact surface of the shroud.

In addition, as described later, the bottom portion (not shown) can extend upward to fix the foot supporting section to the upper foot fixing section or can be used to fix the foot to the footwear during walking.

In the preferred embodiment of the present invention, the soft resilient mat 2 can be fixed to the upper foot fixing section 1 by one of the well-known engaging methods such as bonding with an adhesive, sewing, and engagement with a Velcro fastener, a slide fastener(or a zipper), or a snap fastener. In the case in which the shroud 3 is applied to the resilient mat 2, the resilient mat 2 can be attached using an engagement portion of the shroud 3 according to the well-known methods. Furthermore, in some cases, the bottom portion (not shown) can extend to be attached.

The upper foot fixing section 1 is comprised of a soft material and can have various shapes such as a sock, a rubber boot, a sports shoe, a sandal, a slipper, and the like according to its use. The material of the upper foot fixing section 1 can include various materials such as a soft rubber, a textile, a net, leather, and the like.

Further, a plurality of ventilation holes can be formed in the upper foot fixing section and the design of the foot fixing section can be modified, for example, by forming a transparent

window.

The resilient mat 2 is formed of a soft elastic body itself or includes the shroud. And the material of the elastic body can be classified into an opened elastic body and a closed
5 elastic body, the opened elastic body refers to a elastic body for example, a foam material or structure made of a sponge, or a natural/synthetic resin which contains air inside itself or its structure, having a property of elasticity in the method of discharging air by applying a pressure and pressing the elastic
10 body and recharging air by decreasing the pressure, the closed elastic body refers to a elastic body for example, a filled body having the shape of a closed bag which is filled with a filling material such as air, a fluid, and a gel or a rubber with a property of elasticity of which only the shape can be
15 changed by applying a pressure and compressing the elastic body while the air or filling material is not introduced or discharged. For the various embodiments of the resilient mat 2 one or both type of the resilient bodies can be used.

The material and the structure of the soft elastic body
20 are selected so that the compression rate of the resilient mat is fifty to ninety percent if the footwear is worn.

Further, a bag-shaped closed elastic body is provided with a valve (not shown) so that the property of elasticity can be varied, if necessary, by discharging or refilling the filling
25 material inside .

The planer shape of the resilient mat 2 generally follows that of the bottom surface of the footwear. The thickness (thickness of the resilient mat itself in the case in which the bottom portion is not formed) of the resilient mat 2 is varied
5 according to the weight of the wearer and the property of elasticity of the elastic body. Further, as described above, the soft elastic body of the present invention has a compression rate of fifty to ninety percent when the footwear is worn. Therefore, according to the present invention, it is
10 preferable that the thickness of the elastic body is at least 1 cm from the ground contact surface and at least 0.5 cm in the case for children.

The shroud 3 is formed of the same material as the upper foot fixing section or of a different material from the upper
15 foot fixing section. The shroud 3 can be formed of a soft resilient material and various materials such as a synthetic or natural textile material, synthetic or natural latex, polyurethane, and the like can be used.

FIG. 2 is a perspective view showing a constitution of
20 another preferred embodiment of the present invention.

In the preferred embodiment of Fig. 2, since the basic technical spirit is the same as the preferred embodiment of FIG. 1, the reiterated description will be omitted.

The footwear of the preferred embodiment has the shape of
25 a general shoe or a sports shoe. A resilient mat forming a foot

supporting section has the shape of a sole of a general shoe or a sport shoe in the state in which a pressure is not applied before the footwear is worn. Further, since the compression rate of the footwear becomes fifty to ninety percent if the
5 footwear is worn and pressed, the shape of the footwear is deformed.

An upper foot fixing section 1 has the shape of a general sports shoe. The material of the upper foot fixing section 1 includes various soft materials such as a soft rubber, a
10 textile, a net, leather, and the like.

FIG. 3 is a perspective view showing the constitution of another preferred embodiment of the present invention and shows a case in which the shape of a sandal is applied to an upper foot fixing section 1. Since the basic technical spirit of the
15 preferred embodiment of FIG. 3 is the same as the preferred embodiment of FIG. 1, the reiterated description will be omitted.

The upper foot fixing section 1 forming the shape of a sandal can be attached to a foot supporting section by various
20 methods such as bonding and sewing, and a resilient mat 2 forming the foot supporting section has the shape of a sole of a general shoe or a sports shoe before the footwear is worn and any pressure is not applied.

In case that a shroud is applied to the footwear, the
25 resilient mat 2 is firmly attached to the surface of the

shroud. The upper foot fixing section 1 having the shape of a sandal and the resilient mat 2 forming the foot supporting section can be exchanged if necessary and can be detachably attached to one another.

5 FIG. 4a is a perspective view showing the formation of another preferred embodiment of the present invention and shows a preferred embodiment in which the technical spirit of the present invention is applied in the form of a sock.

FIG. 4b is a view showing a method by which the resilient
10 mat 2 is exchanged.

In the preferred embodiment, an upper foot fixing section 1 and a foot supporting section form the shape of a sock in their appearance. A reception space for receiving the resilient mat 2 is formed between the upper foot fixing section 1 and the
15 foot supporting section so that the resilient mat 2 can be received in the reception space.

In the preferred embodiment, the upper foot fixing section is formed of a synthetic or natural textile, and can be formed of a soft rubber if necessary. The upper foot fixing section
20 and the foot supporting section are integrally formed or are separately formed to be attached to each other by means of sewing.

Further, a part or whole of the upper foot fixing section and the foot supporting section can be detachably attached by
25 an engagement device such as a Velcro fastener, a slide

fastener(zipper), or a snap fastener so that the resilient mat 2 can be inserted or withdrawn when the upper foot fixing section and the foot supporting section are separated from each other. In the preferred embodiment, the overall footwear is
5 attached by sewing and a slide fastener is mounted to a heel portion of a foot so that the resilient mat 2 can be inserted into and withdrawn from the reception space if the slide fastener is opened, as shown in FIG. 4b.

FIGs. 5a to 5f are views for explaining the engagement
10 structure of an upper foot fixing section and a foot supporting section of the present invention. In the preferred embodiment of the present invention, the foot supporting section 1 includes a shroud 3 for covering a portion of the outer surface of a soft resilient mat 2 and receiving and fixing the soft
15 resilient mat 2. In this case, the upper foot fixing section and the foot supporting section are attached to each other through a portion of the shroud 3. The shroud 3 can be integrally or separately formed with and from the resilient mat 2.

20 For reference, in the engagement structure, although the engagement portion is shown as an extending portion of the shroud 3, it can be an extending portion of a bottom portion (not shown).

Hereinafter, the engagement structure of the upper foot
25 fixing section and the foot supporting section will be

explained in detail with reference to the drawings.

Referring to FIG. 5a, the shroud 3 of the resilient mat of the foot supporting section is fixed to and attached to the foot fixing section by bonding or sewing in order to attach the foot supporting section including the resilient mat to the foot fixing section. A portion which can be opened and closed to exchange the resilient mat by inserting and withdrawing the resilient mat without separating the entire shroud from the upper foot fixing section is formed on the outer surface of the shroud 3.

In the preferred embodiment of the present invention, although the portion, which can be opened or closed by using a slide fastener 4, is formed at the heel portion of the shroud 3, it can be mounted to any surface according to the use and the design of the footwear.

In the preferred embodiment of the present invention, by using the portion which can be opened and closed, the resilient mat 2 formed of a elastic body can be protected and easily received and fixed additionally and only the resilient mat can be exchanged, with the appearance of the footwear maintaining the original shape.

FIG. 5b is a view showing the state in which a foot supporting section is detachably attached in the shape of an overshoe by extending the upper portion of the shroud 3 of the foot supporting section to cover and fix the top of the foot

fixing section.

In the preferred embodiment, the upper foot fixing section can be separated from the foot supporting section by stripping off the shroud in the form of an overshoe. During the
5 separation, the resilient mat 2 can be exchanged and only the upper foot fixing section can be replaced by another one or can be washed.

FIG. 5c is a cross-sectional view showing the state in which the shroud 3 extends to an ankle portion over the top of
10 the foot to be fixed and the foot supporting section is fixed in the form of a dual sock.

In the preferred embodiment, the upper foot fixing section can be separated from the foot supporting section by stripping off the shroud from the upper foot fixing section as in the
15 form of an overshoe. Further, during the separation, a resilient mat 2 can be exchanged and only the upper foot fixing section can be replaced by another one or can be washed.

Further, in this case, as shown in the figure, a space can be formed at the heel portion of the foot to be designed for
20 ventilation.

FIG. 5d shows a structure in which the foot supporting section is fixed in the form of a dual sock by extending a shroud to the ankle portion over the top of the foot at the front portion of the foot to fix the shroud. The rear portion
25 of the shroud extends only to a heel portion of the foot and is

attached by sewing. In the structure, the resilient mat 2 can be exchanged by installing a slide fastener at the rear end of the shroud and by opening and closing only the heel portion.

The engagement structure is suitable especially for the case in which the foot fixing section and the foot supporting section are formed of a textile material or a soft rubber and are shaped like socks.

FIG. 5e shows the state in which a slide fastener 4 is mounted to the upper end of the shroud 3 as an engagement portion and the shroud 3 is attached to the slide fastener mounted to the lower end of the corresponding upper foot fixing section.

In the engagement structure, if the slide fastener is opened, the foot supporting section is separated so that the resilient mat 2 can be exchanged. In the preferred embodiment, the slide fastener 4 is formed in the resilient mat itself if the shroud is not applied to the resilient mat.

Referring to FIG. 5f, the bottom portion, the upper end of the shroud, or the resilient mat itself is attached to the upper foot fixing section 1 by using a Velcro fastener.

In the preferred embodiment, a Velcro fastener 5a is mounted only to the outer peripheral surface of the upper portion of the foot supporting section and is attached to a Velcro portion fastener 5b mounted to the lower end of the upper foot fixing section in order to prevent the wearing

feeling of the footwear from lowering due to the Velcro engagement. Further, the Velcro portion can extend not only on the engagement surfaces of the foot fixing section and the foot supporting section but also on the circumference of the side
5 surfaces of the foot fixing section and the foot supporting section to reinforce the engagement by using a Velcro belt 5c.

For actual embodiments, the two engagement methods can be used independently or together.

FIGs. 6a to 6g are views for explaining formation methods
10 of foot supporting sections according to the structures of the resilient mat 2, the shroud 3, and the bottom portion 4 of the present invention.

FIG. 6a shows a preferred embodiment including only the resilient mat 2. The resilient mat, which is a elastic body,
15 may have a portion for functioning as a shroud integrally formed on the outer surface thereof during the manufacturing process. In this case, depending on manufacturing method for use, the shroud or the portion functioning as the shroud can be formed of the same material as the elastic body, thereby
20 strengthening the mechanical friction of the outer surface of the elastic body . The resilient mat can be directly attached to the upper foot fixing section or can be used as an inserted material according to the form of the embodiment. Further, a bottom portion (not shown) preventing slide movement of the
25 footwear can be selectively formed on the ground contact

surface.

In the case in which the shroud described later is applied, the shroud can be integrally formed with the resilient mat when the resilient mat is manufactured. In the case in
5 which the shroud is separately manufactured, it can be detachably attached to the resilient mat as well as firmly attached to the resilient mat by bonding etc.

FIG.6b shows a preferred embodiment in which the shroud 3 covers the entire elastic body. In this case, for example, the
10 shroud should be an essentially soft resilient membrane or film such as a thin rubber, resilient textile, etc. In the preferred embodiment, the ground contact surface itself functions as a bottom portion by making the ground contact surface portion thicker than the other portions when the shroud is
15 manufactured.

FIG. 6c shows the case in which the shroud 3 covers only the periphery of the upper surface of the resilient mat to minimize the change of the wearing feeling of the footwear. Similarly, the ground contact surface portion is made thicker
20 than the other portions when the shroud is manufactured.

The portion of the shroud, which covers the resilient mat, functions as an engagement portion when the upper foot fixing section is attached to the shroud by bonding, sewing, or Velcro, etc.

25 Referring to FIG. 6d, the shroud extends to the upper side

of the resilient mat. An attachment portion such as a slide fastener, a Velcro fastener, or a snap fastener is mounted to the extending portion of the shroud to be attached to the corresponding portion of the upper foot fixing section. The
5 shroud can extend further to reach the upper foot fixing section in the form of an overshoe or a dual sock. Likewise, the ground contact surface portion is made thicker than the other portions when the shroud is manufactured.

FIGs. 6e to 6g show the cases in which the bottom portion
10 6 is separately formed on the ground contact surface of the shroud.

FIGs. 7a and 7b are perspective views showing the preferred embodiments in which the resilient mat has divisions. In FIG. 7a, the resilient mat is divided to the right and left
15 of the foot. In FIG. 7b, the resilient mat is divided to the right, left, front, and rear of the foot so that the resilient mat can have the shape of a matrix.

In this case, the shroud (not shown) can have the same shape as the outer shape of the resilient mat 2 to receive the
20 resilient mat 2, or can receive the resilient mat regardless of the shape of the resilient mat.

In this case, the shroud or a portion functioning as the shroud can be formed of the same material as the elastic body thereby strengthening the mechanical friction of the outer
25 surface of the elastic body depending on manufacturing methods.

The resilient mat can be directly attached to the upper foot fixing section or can be used as an inserted material according to the form of the embodiment. Further, a bottom portion (not shown) preventing slide movement of the footwear can be selectively formed on the ground contact surface. Further, the wearing feeling and the correcting function during walking can be changed depending on the requirements of the wearer by regulating the shape and/or the materials of the divisions of the resilient mat.

FIGs. 8a and 8b show the structure of the shroud 3 in which a resilient mat is manufactured by inserting resilient bodies into chambers formed in the divided shroud 3. The shroud forms a plurality of chambers receiving the resilient bodies and the resilient mat 2 is formed by the insertion of the plurality of resilient bodies into the chambers. In this case, a shroud cover (not shown) covering opened portions of the resilient mat is selectively used. In the case of the shroud cover being used, the shroud cover is formed of a soft and ventilating material.

FIGs. 9 and 10 are views for explaining the compression rate relation in the case in which the footwear is worn, before and after the insertion material is inserted into the elastic body of the resilient mat.

In the case of forming a the body of the resilient mat with foam material of a synthetic resin for example,

polyurethane, the elastic body including the insertion material can be manufactured by inserting polyurethane particles or granules during foaming for making the shape of the foam material. Further, in the case of the closed elastic body in which a fluid or a gel is filled inside of a bag, it can be manufactured by putting the elastic particles such as the polyurethane granules before filling the liquid or the gel into the bag.

FIG. 9c is a graph showing the resilient repulsive force F as a function of the change of the difference Δd between the thickness d_1 of the resilient mat before wearing the footwear and the thickness d_2 of the resilient mat after wearing the footwear in the case in which a general elastic body is applied to the resilient mat.

FIG. 10c is a graph showing the resilient repulsive force F as a function of the change of the difference Δd between the thickness d_1 of the resilient mat before wearing the footwear and the thickness d_2 of the resilient mat after wearing the footwear in the case in which granules harder than a general elastic body are inserted into the inside of the resilient mat.

FIG. 9a shows that the resilient repulsive force is changed to the vicinity of the critical thickness d_1 of the resilient mat in a predetermined linear shape.

On the other hand, in the case of the resilient mat of FIG. 10a, which includes granules harder than the material of

the elastic body, the curve of the resilient repulsive force can be regulated according to the number and type of granules as in the graph.

The drawings disclose only the cross-sections for
5 convenience, but the present invention is applied to resilient bodies forming resilient mats of various shapes.

The footwear according to the present invention has a simple structure and can give a feeling of walking barefoot on a sponge mat or on a lawn like a soft carpet to provide
10 complete comfortableness to the wearer during walking.

Further, according to the present invention, the wearing feeling and the correction function can be easily changed during walking if necessary.

Furthermore, the present invention can provide complete
15 comfortableness to the wearer during waking and allows the maximum degree of freedom to the foot.

WHAT IS CLAIMED IS:

1. Footwear comprising:

An upper foot fixing section for covering and fixing an
5 upper portion of a foot; and

A foot supporting section attached to the upper foot
fixing section for supporting a lower portion of the foot;

wherein the foot supporting section comprises a resilient
mat having a soft elastic body which can be deformed according
10 to the shape of the foot.

2. Footwear according to claim 1, wherein the foot
supporting section further comprises a shroud covering at least
a portion of the outer surface of the resilient mat and fixing
15 the resilient mat.

3. Footwear according to claim 2, wherein the foot
supporting section comprises a bottom portion formed on the
outer surface of the shroud for preventing slide movement of
20 the footwear when the footwear makes contact with the ground.

4. Footwear according to claim 3, wherein the bottom
portion is integrally formed with the shroud by forming the
ground contact portion of the shroud thicker than the other
25 portions.

5. Footwear according to claim 3, wherein the bottom portion is formed by coating at least a portion of the ground contact portion of the shroud.

5 6. Footwear according to claim 2, wherein the shroud is formed of a textile material.

7. Footwear according to claim 2, wherein the shroud is formed of a latex material.

10

8. Footwear according to claim 2, wherein a portion for inserting and withdrawing the resilient mat is formed on the surface of the shroud.

15 9. Footwear according to claim 2, wherein the shroud is detachably attached to the foot fixing section so that the foot supporting section can be attached to the foot fixing section.

10 10. Footwear according to claim 9, wherein the foot supporting section is attached to the foot fixing section by extending the upper end of the shroud so that the shroud can cover and fix at least a portion of an upper portion of the foot fixing section.

25 11. Footwear according to claim 9, wherein the foot

supporting section is attached to the foot fixing section by engaging the upper end of the shroud with the foot fixing section using a slide fastener.

5 12. Footwear according to claim 9, wherein the foot supporting section is attached to the foot fixing section by engaging the shroud with the foot fixing section using a Velcro fastener.

10 13. Footwear according to claim 2, wherein the foot supporting section is attached to the foot fixing section by bonding the upper end of the shroud to the lower end of the foot fixing section.

15 14. Footwear according to claim 2, wherein the shroud comprises at least one chamber for receiving the elastic body.

 15. Footwear according to claim 14, wherein the elastic body received in the chamber can be exchanged.

20

 16. Footwear according to claim 1, wherein the elastic body forming the resilient mat is an opened elastic body which discharges air by applying a pressure and pressing the elastic body and can be refilled with air by decreasing the pressure.

25

17. Footwear according to claim 1, wherein the elastic body forming the resilient mat is a closed elastic body which does not discharge air by applying a pressure.

5 18. Footwear according to claim 17, wherein the closed elastic body is a filled body of which the inside is filled with a filling material and the filled body is provided with a valve so that the filling material in the inside of the filled body can be discharged or refilled.

10

19. Footwear according to claim 1, wherein the resilient mat has the shape of a sole of a shoe.

20. Footwear according to claim 1, wherein the resilient
15 mat has the shape of a sole of a sports shoe.

21. Footwear according to claim 1, wherein the resilient mat has the shape of a sole of a sandal.

20 22. Footwear according to claim 1, wherein the resilient mat is divided into a plurality of divisions each of which comprises a elastic body.

23. Footwear according to claim 22, wherein the plurality
25 of divisions comprises the resilient bodies have various

properties of elasticity.

24. Footwear according to claim 23, wherein at least one of the resilient bodies forming the divisions is an opened
5 elastic body which discharges air by applying a pressure and pressing the elastic body and can be refilled with air by decreasing the pressure.

10 25. Footwear according to claim 23, wherein at least one of the resilient bodies forming the divisions is a closed elastic body that does not discharge air by applying a pressure.

15 26. Footwear according to claim 25, wherein the closed elastic body is a filled body of which the inside is filled with a filling material, and the filled body is provided with a valve so that the filling material in the inside of the filled body can be discharged or refilled.

20

27. Footwear according to claim 1, wherein the resilient mat is divided into an upper portion comprising at least one opened elastic body and a lower portion including at least one closed elastic body.

25

28. Footwear according to claim 1, wherein the elastic body forming the resilient mat comprises hard elastic particles inside thereof.

5 29. Footwear according to claim 1, wherein the thickness of the foot supporting section is variable in proportion to the weight of a wearer.

10 30. Footwear according to claim 29, wherein the thickness of the foot supporting section is compressed in proportion to the weight of a wearer at a compression rate of fifty to ninety percent.

15 31. Footwear according to claim 29, wherein the thickness of the foot supporting section is at least 0.5 mm from the ground contact surface in the case for children.

20 32. Footwear according to claim 29, wherein the thickness of the foot supporting section is at least 1 cm from the ground contact surface.

33. Footwear according to claim 1, wherein the upper foot fixing section has the shape of a shoe.

25 34. Footwear according to claim 1, wherein the upper foot

fixing section has the shape of a sandal.

35. Footwear according to claim 1, wherein the upper foot
fixing section is formed of a soft material and has the shape
5 of a sock.

36. Footwear according to claim 2, wherein the upper foot
fixing section is formed of a textile material, has the shape
of a sock, and is integrally formed with the shroud to be
10 attached to the shroud at an upper end portion of the foot.

37. Footwear according to claim 36, wherein a portion of
the engagement portion of the upper foot fixing section and the
shroud can be opened and closed.

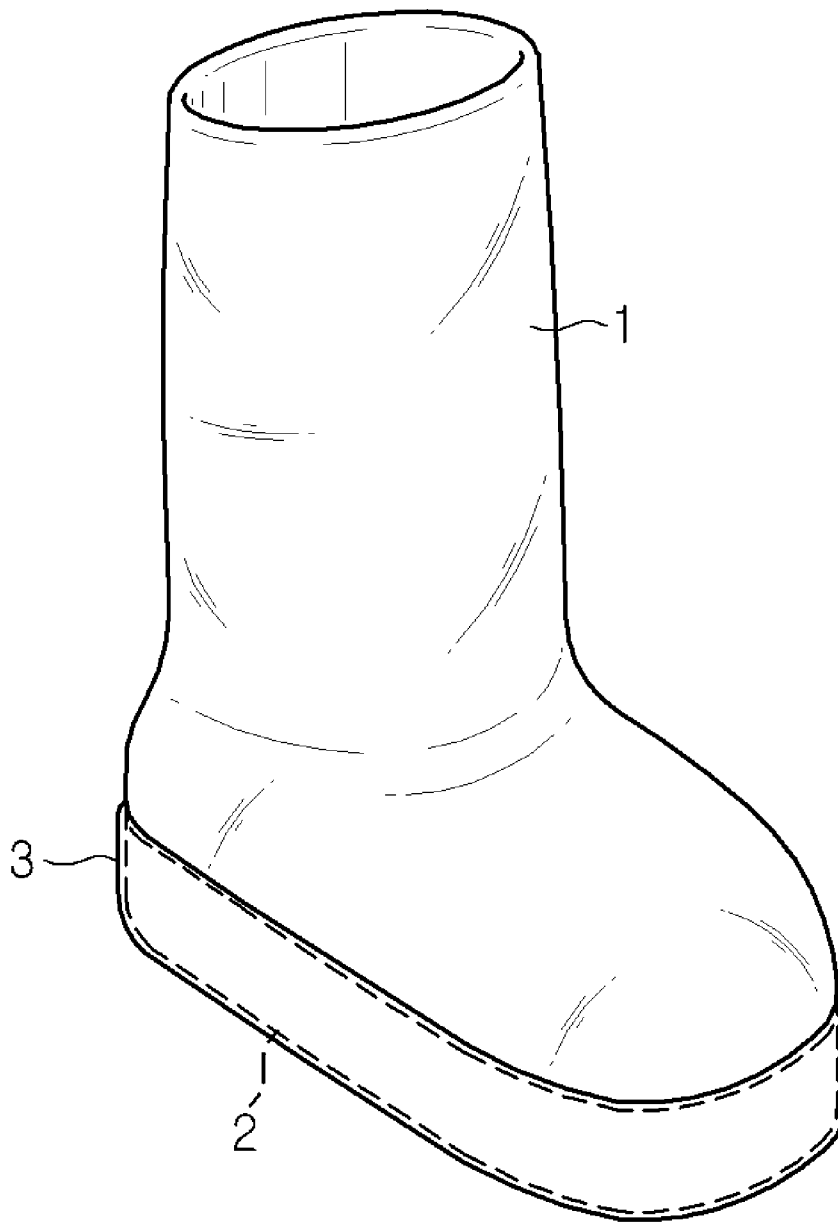
15

38. Footwear according to claim 1, wherein the upper foot
fixing section has a plurality a ventilation holes.

39. Footwear according to claim 1, wherein the upper foot
20 fixing section has a plurality of transparent windows

【DRAWINGS】

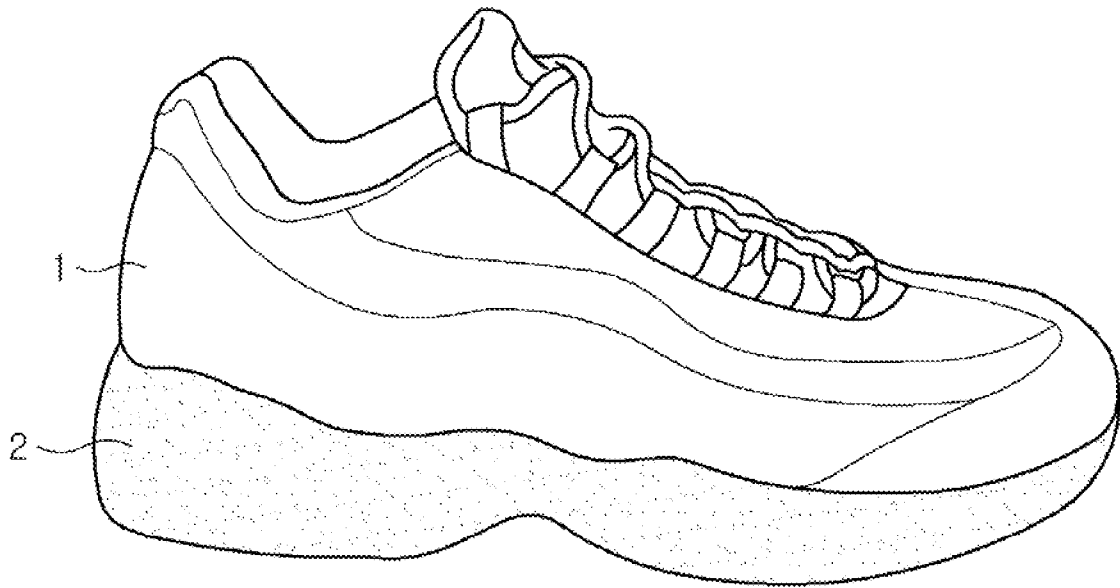
【FIG. 1】



5

10

【 FIG. 2】

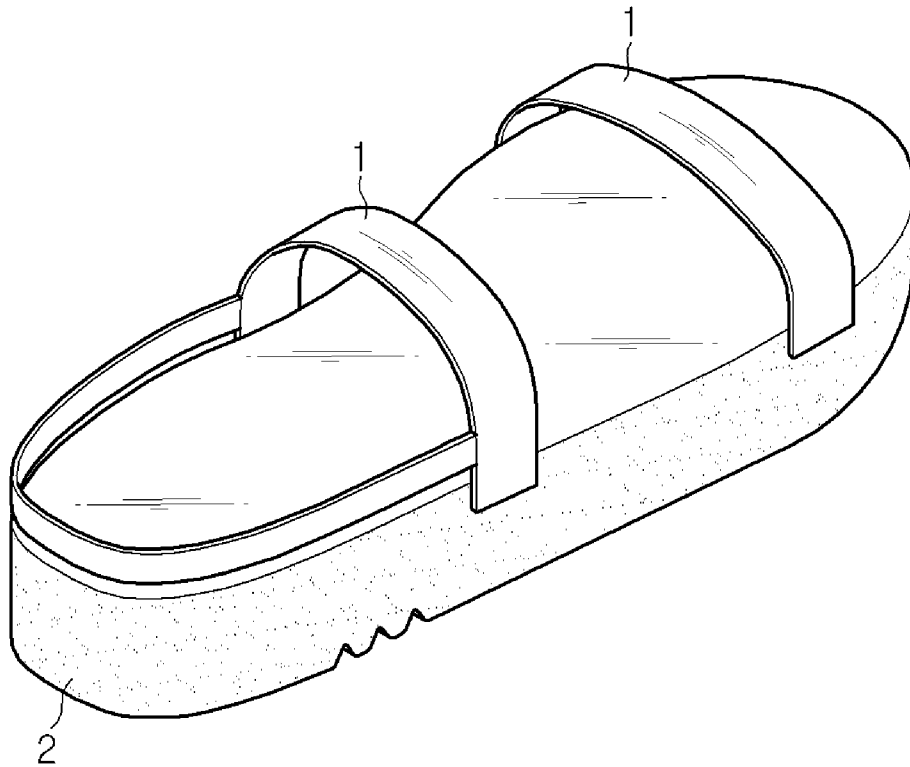


5

10

15

【 FIG. 3】

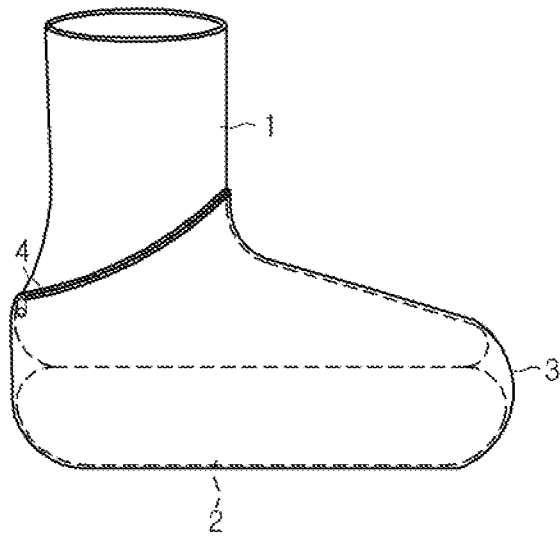


5

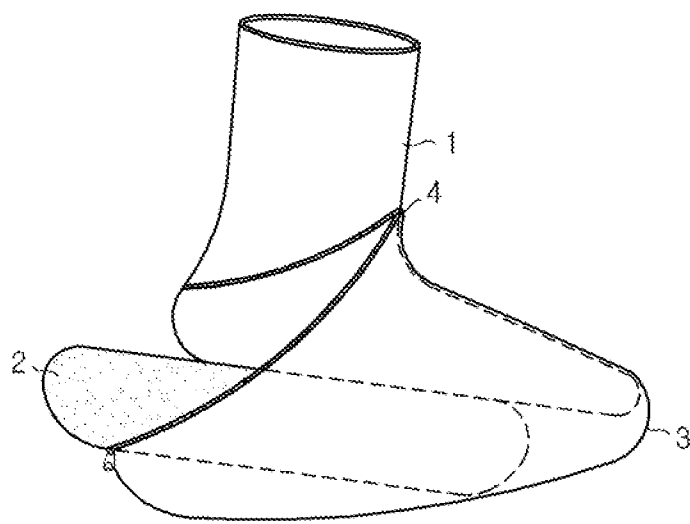
10

15

【FIG. 4】

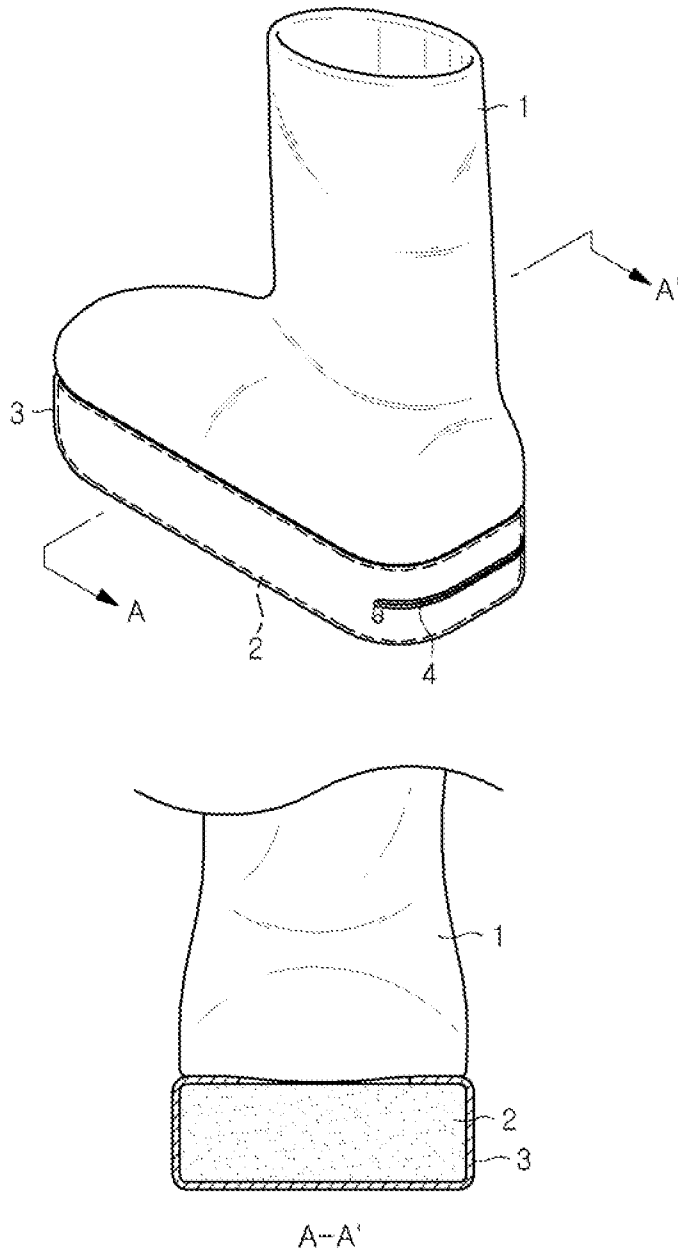


(a)

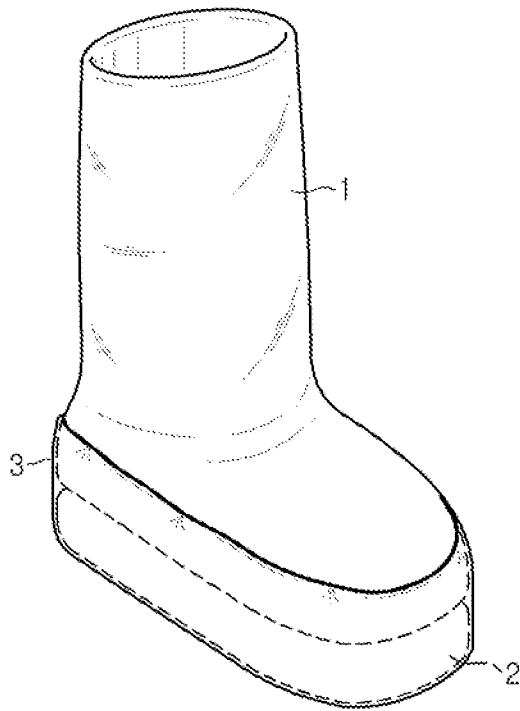


(b)

【 FIG. 5a】



【FIG. 5b】

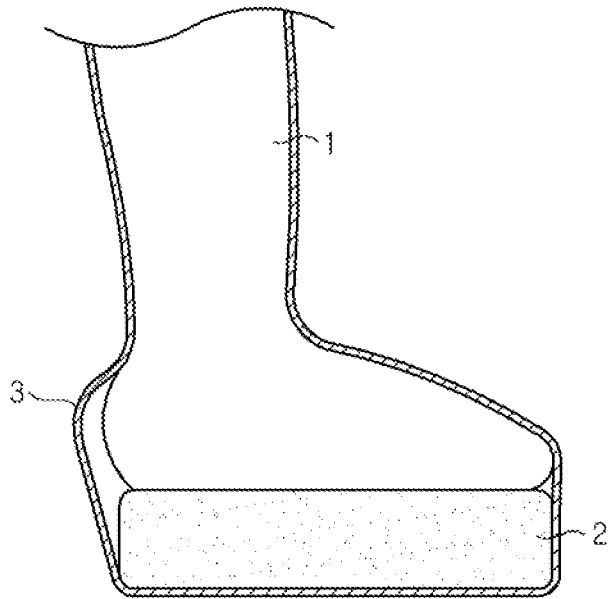


5

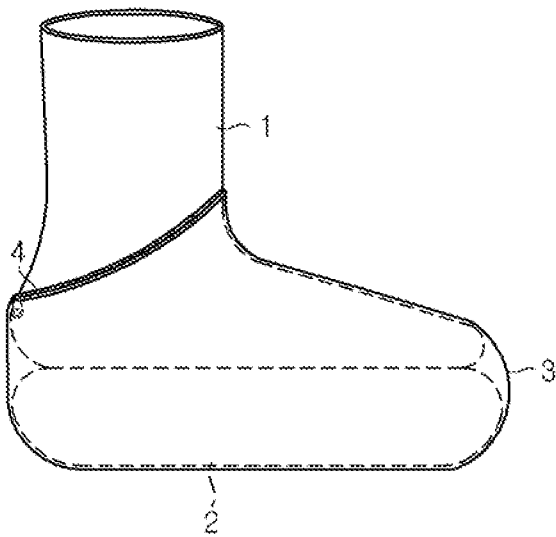
10

15

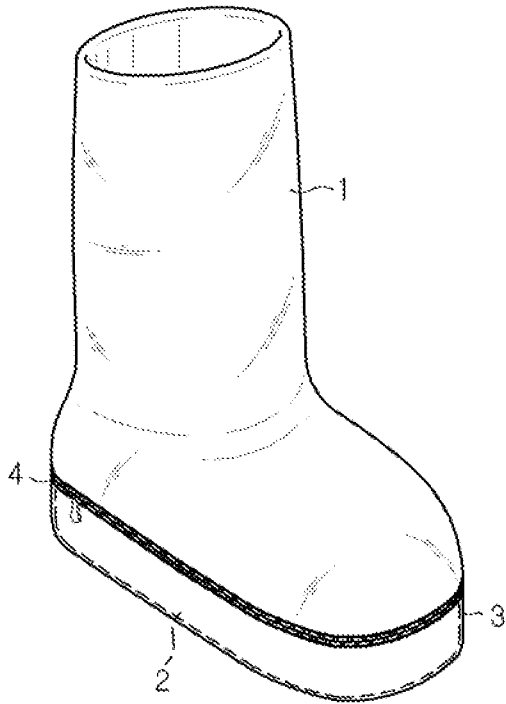
【 FIG. 5c】



5 【 FIG. 5d】



【 FIG. 5e】

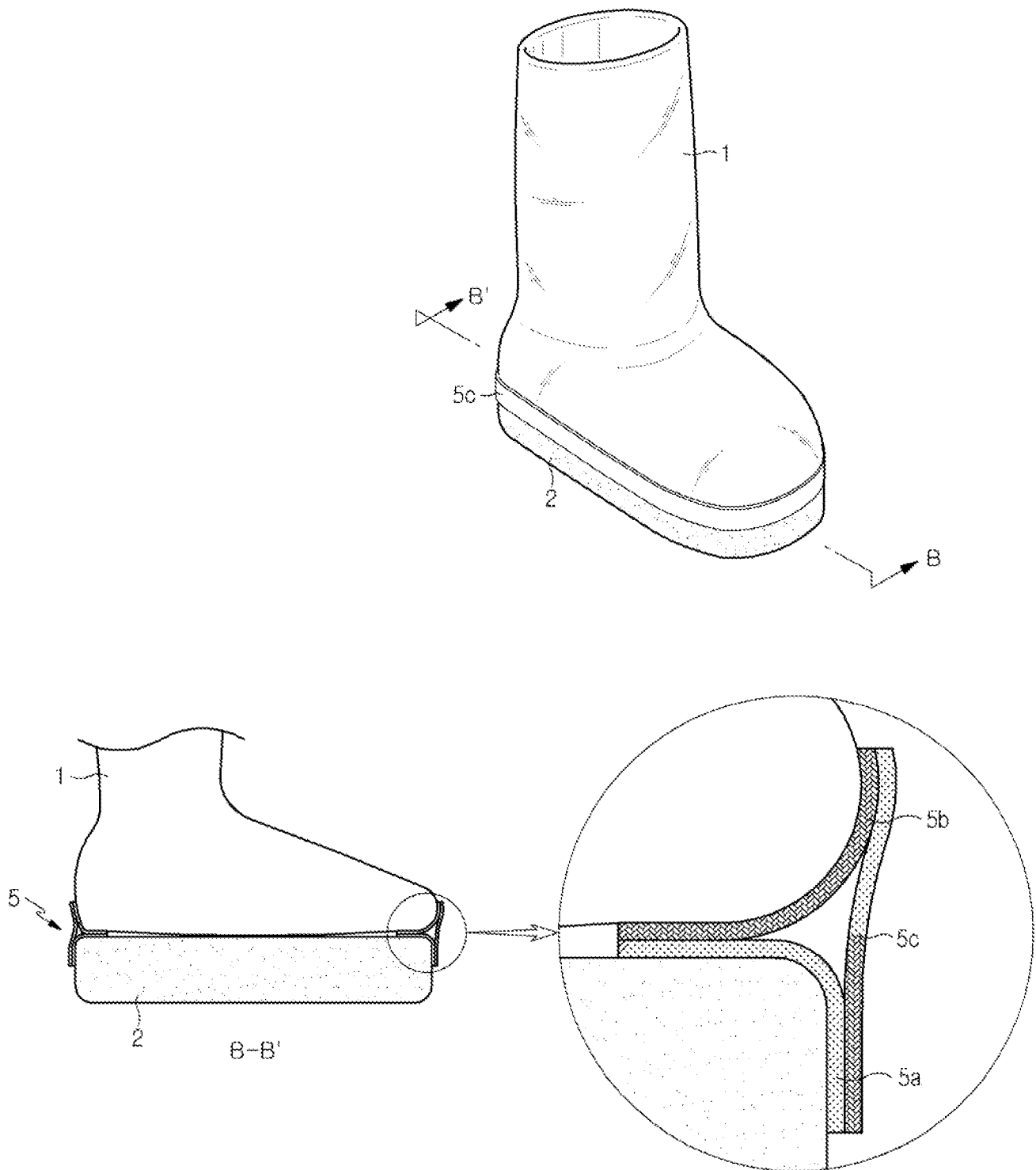


5

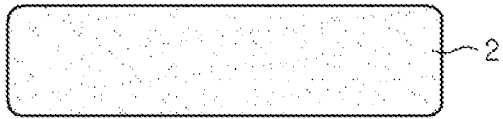
10

15

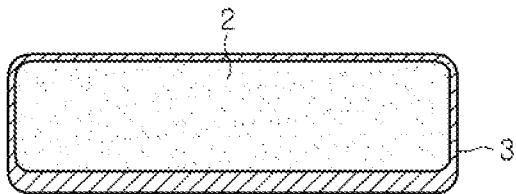
【 FIG. 5f】



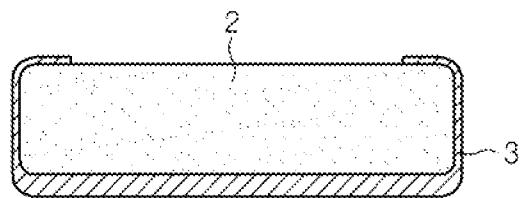
【 FIG. 6a】



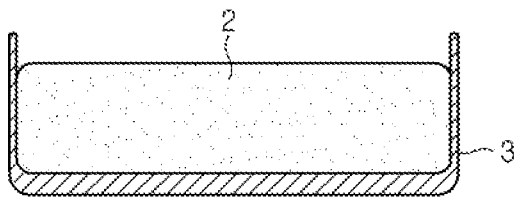
【 FIG. 6b】



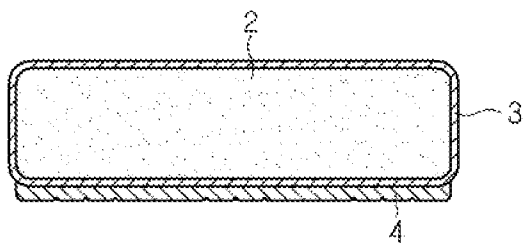
5 【 FIG. 6c】



【 FIG. 6d】



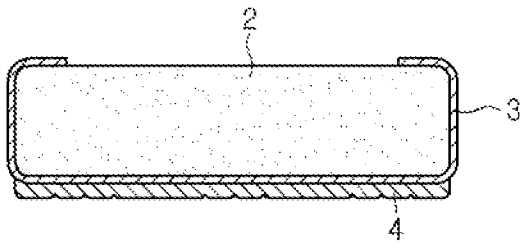
【 FIG. 6e】



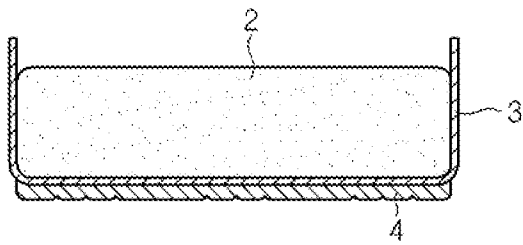
10

15

【 FIG. 6f】



【 FIG. 6g】



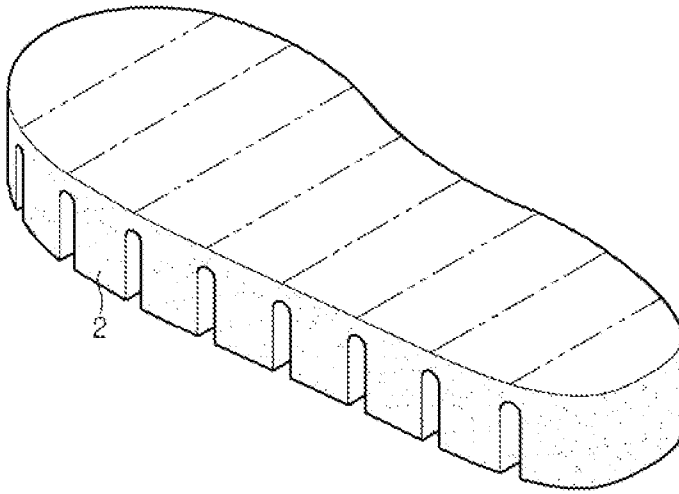
5

10

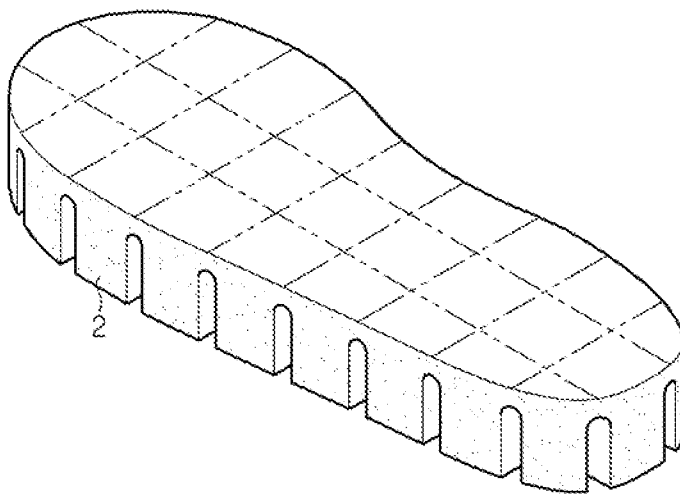
15

20

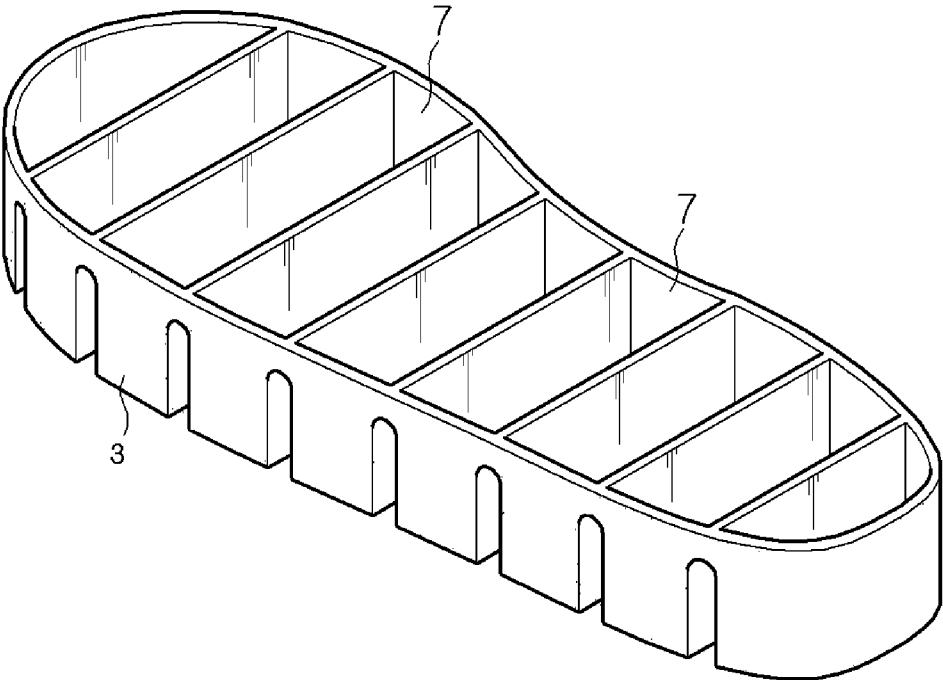
【 FIG. 7a】



5 【 FIG. 7b】



【 FIG. 8a】

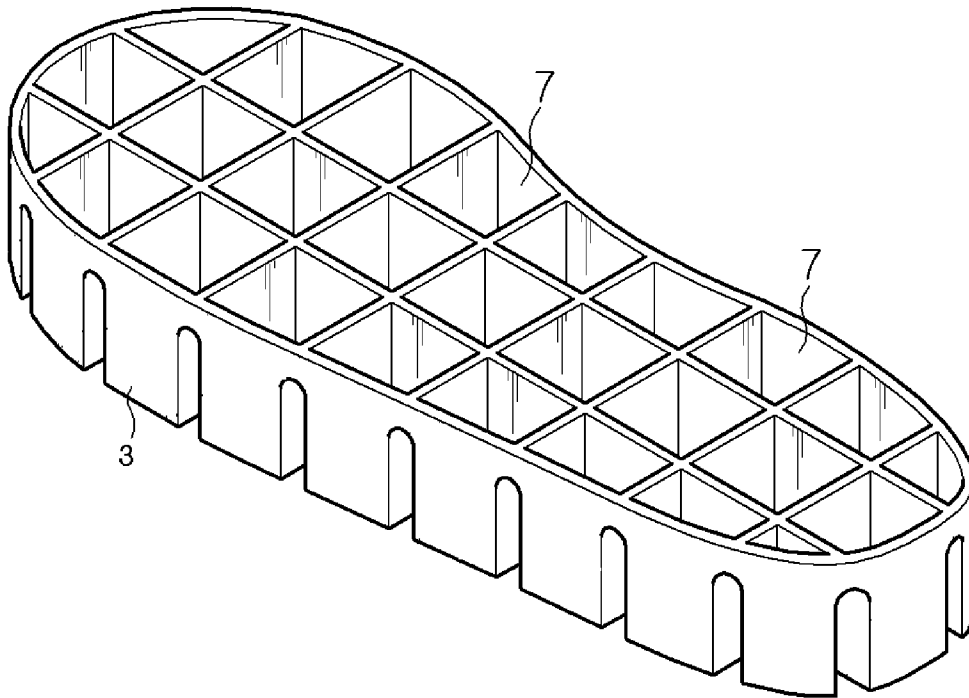


5

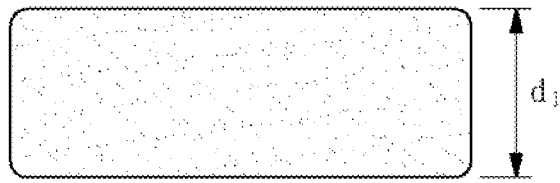
10

15

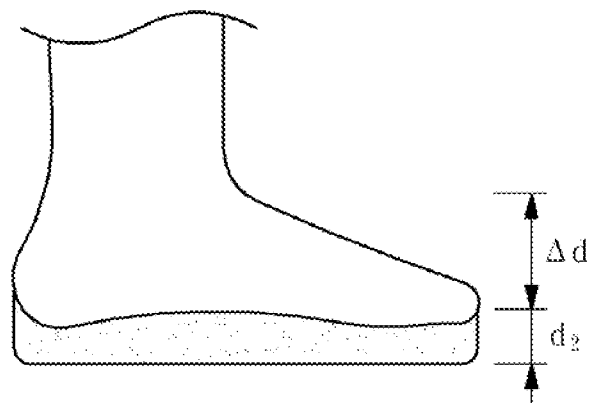
【 FIG. 8b】



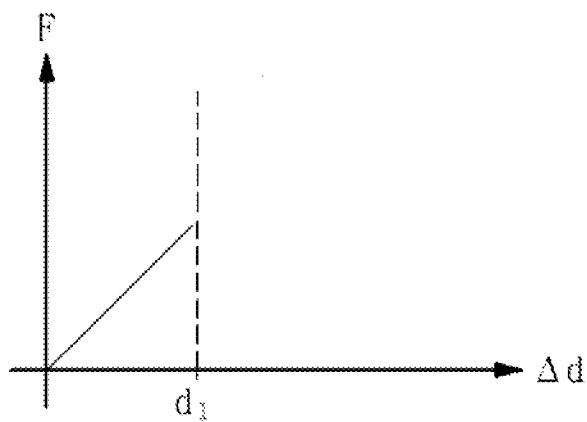
【 FIG. 9】



(a)

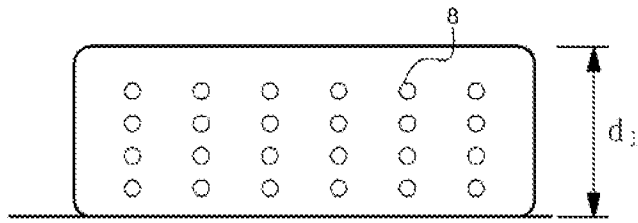


(b)

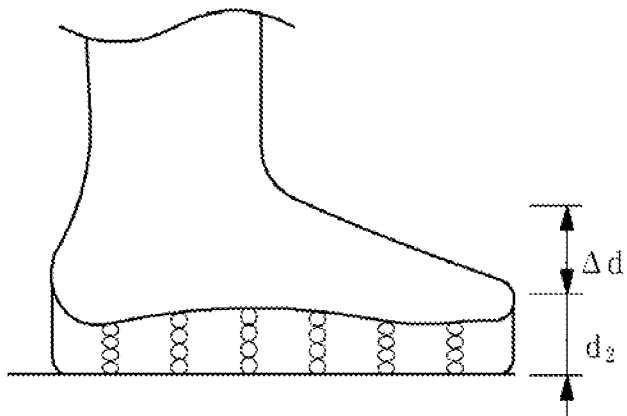


(c)

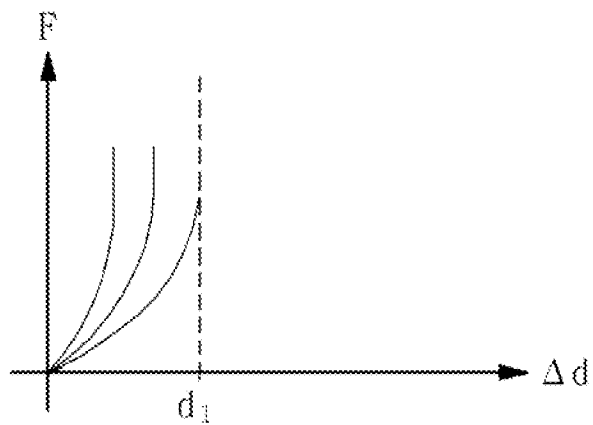
【 FIG. 10】



(a)



(b)



(c)