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(54) SHOE OUTSOLE

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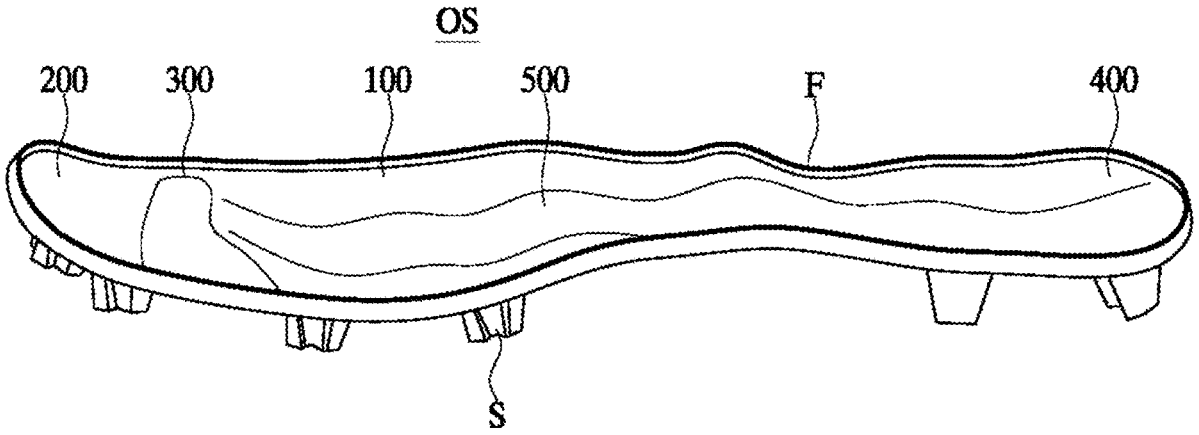
(57) **ABSTRACT**

A shoe outsole includes a propulsion strengthening part, corresponding to the plantar arch of a wearer, between a front end portion of a sole-corresponding part and a toe-corresponding part, thereby enabling propulsion to be strengthened. The toe-corresponding part is formed to be upwardly inclined toward the front and a heel-corresponding part is formed to be upwardly inclined toward the back such that a shock absorbing function is performed and a wearer is helped with a foot moving action, thereby enabling brisk gait and running and reduced exhaustion of physical strength of a wearer.



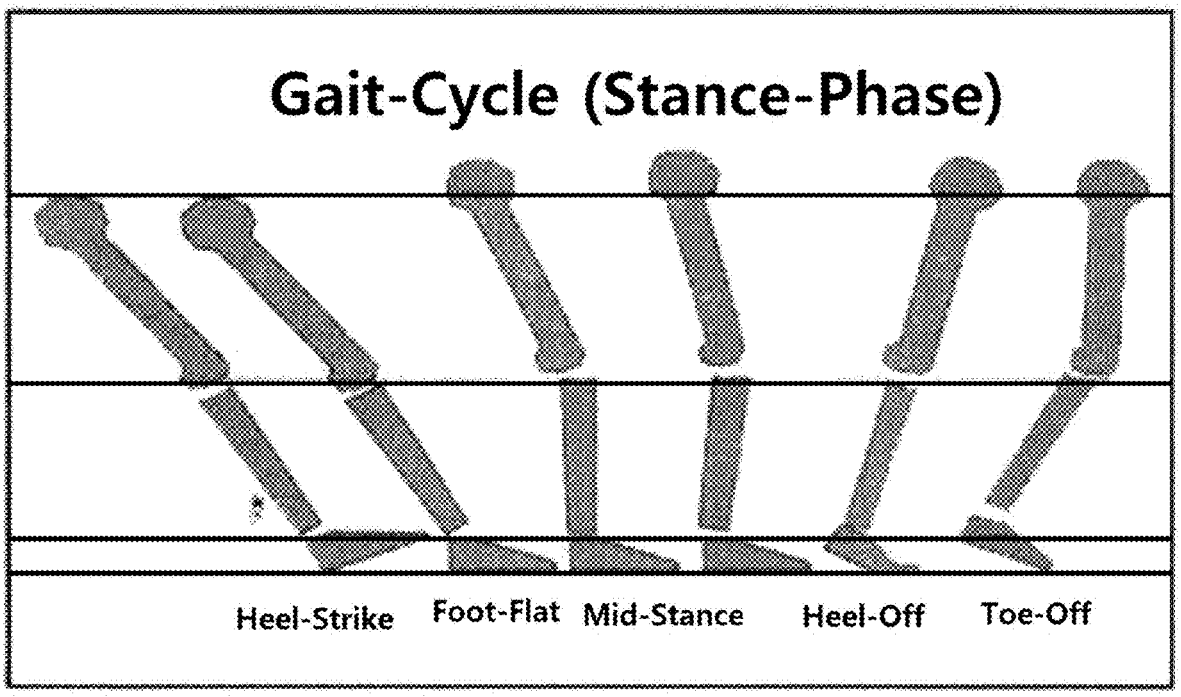

Gait-Cycle (Stance-Phase)
Heel-Strike
Foot-Flat
Mid-Stance
Heel-Off
Toe-Off

FIG. 1

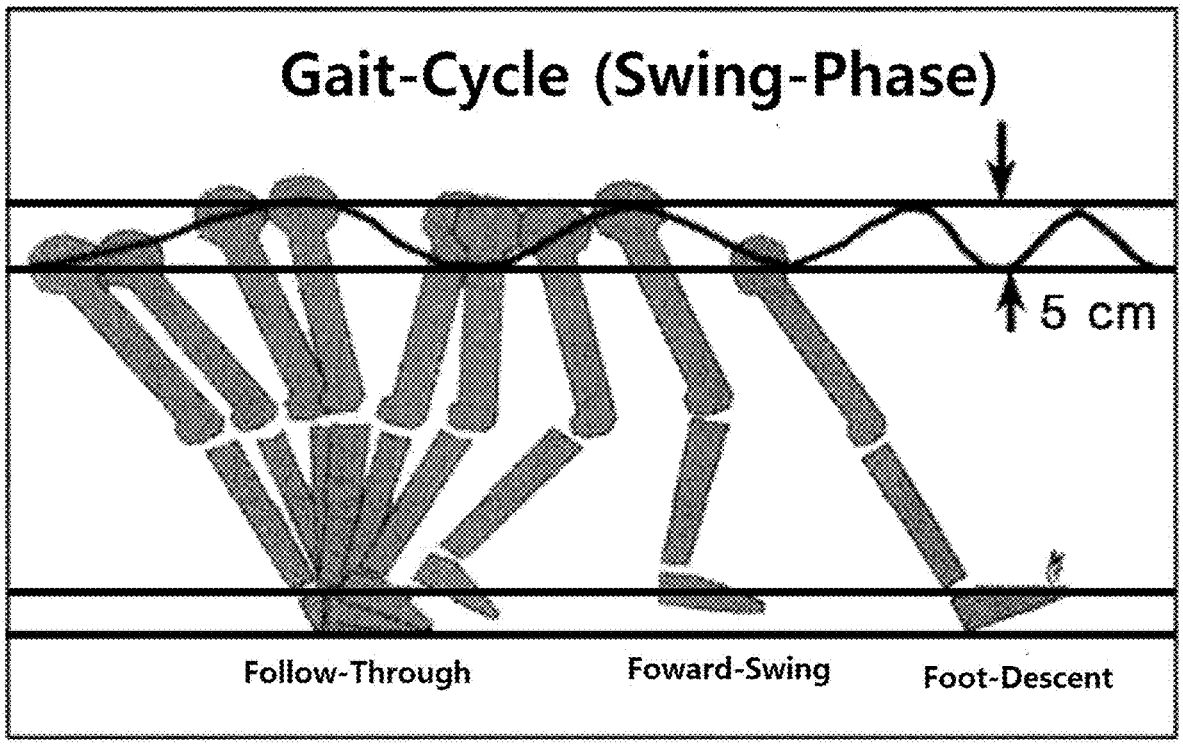

Gait-Cycle (Swing-Phase)
5 cm
Follow-Through
Foward-Swing
Foot-Descent

FIG. 2

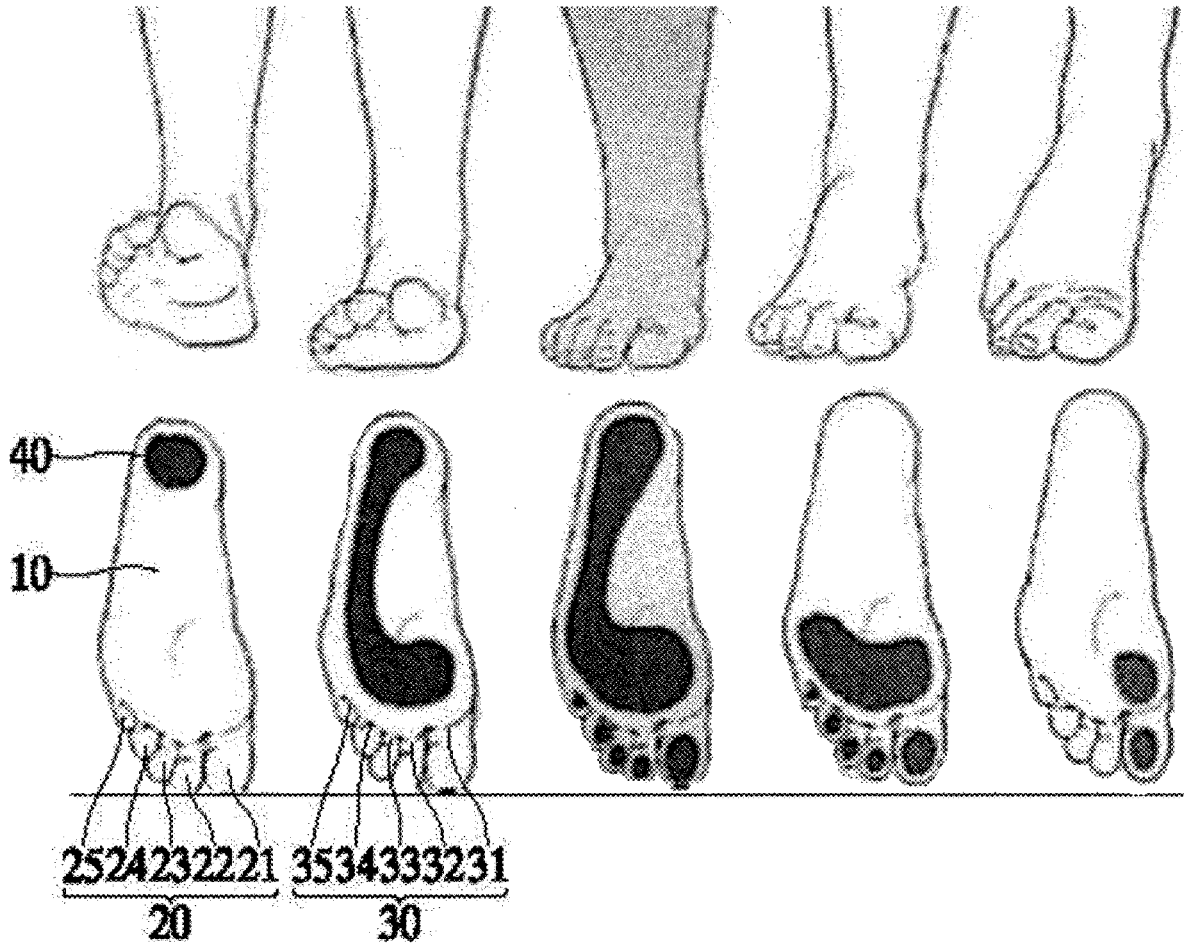


FIG. 3

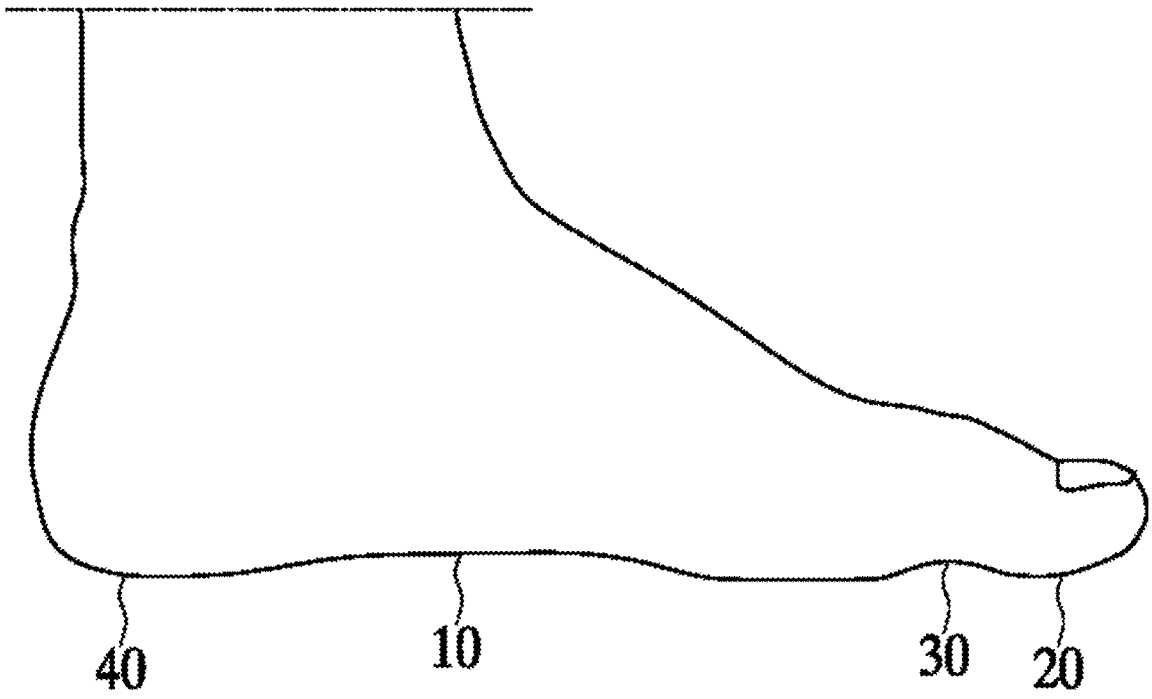


FIG. 4

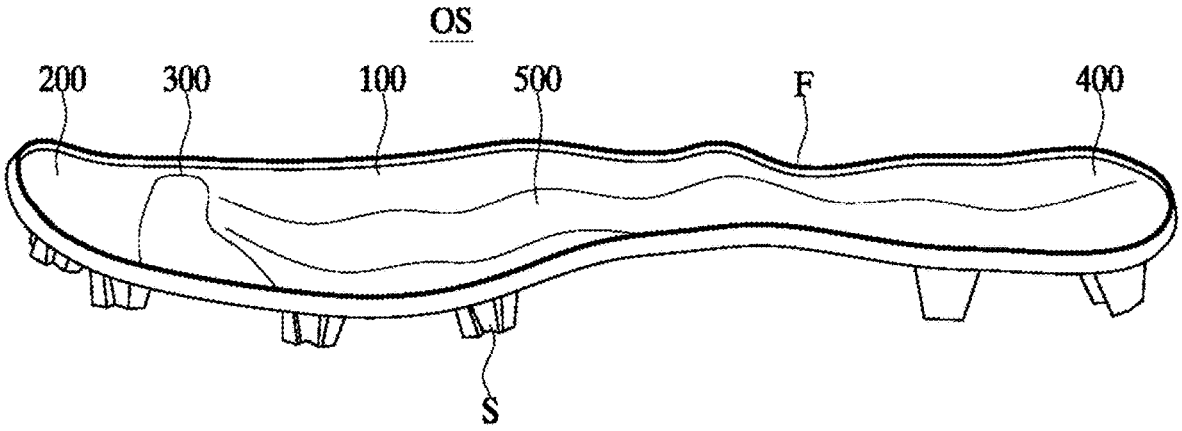

OS
200
300
100
500
F
400
S

FIG. 5

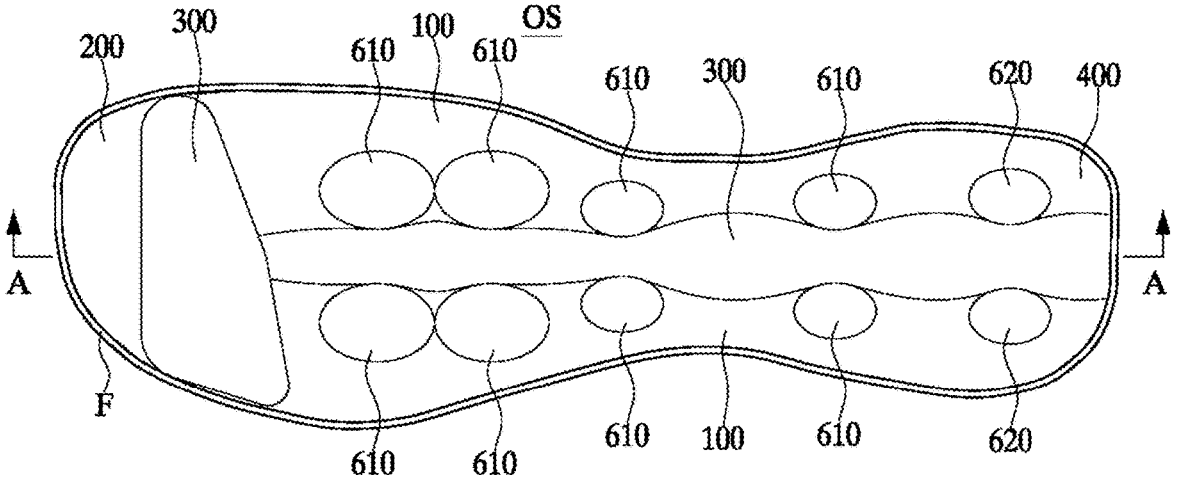

OS
200
300
610
100
610
610
300
610
620
400
A
A
F
610
610
610
100
610
620

FIG. 6

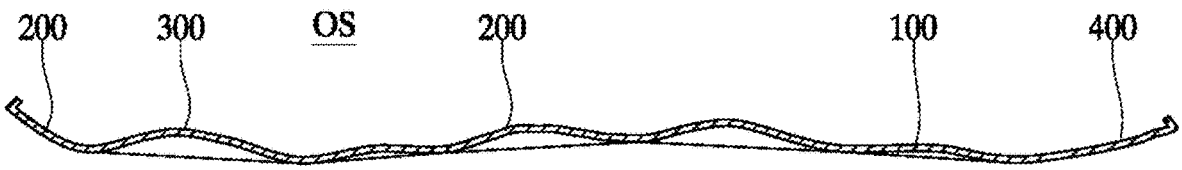


FIG. 7

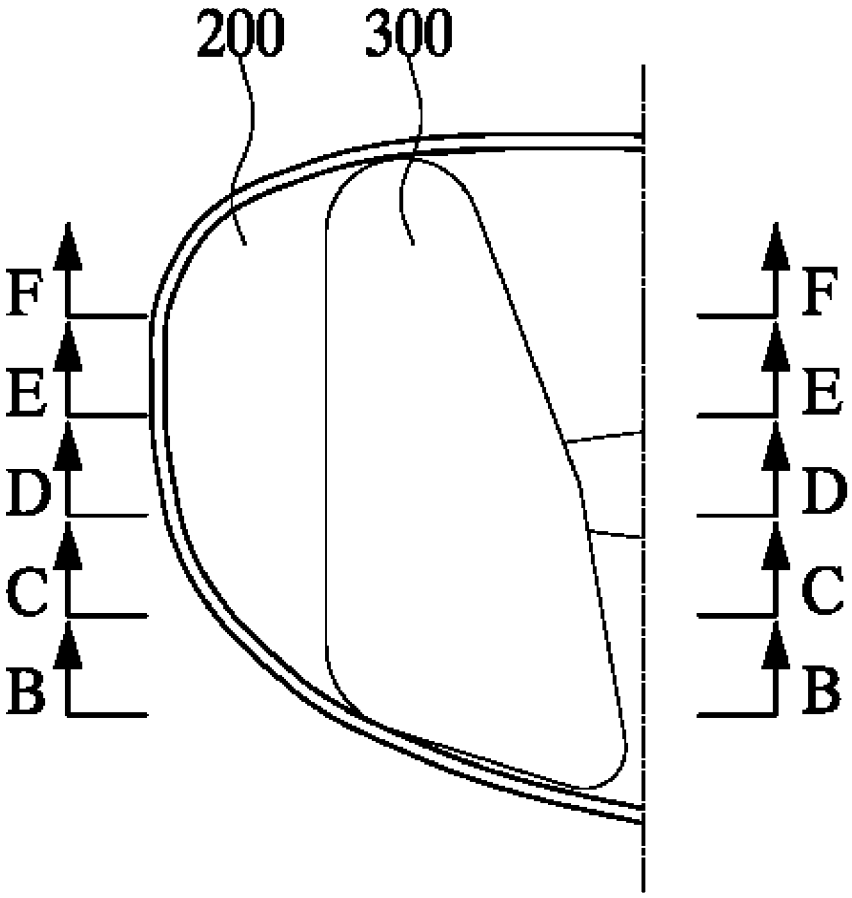


FIG. 8

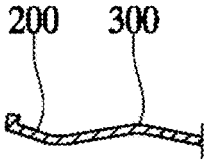


FIG. 9(a)

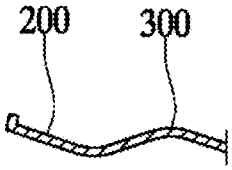


FIG. 9(b)

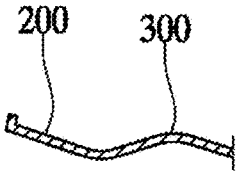


FIG. 9(c)

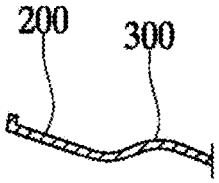


FIG. 9(d)

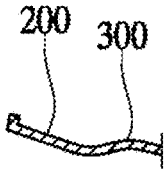


FIG. 9(e)

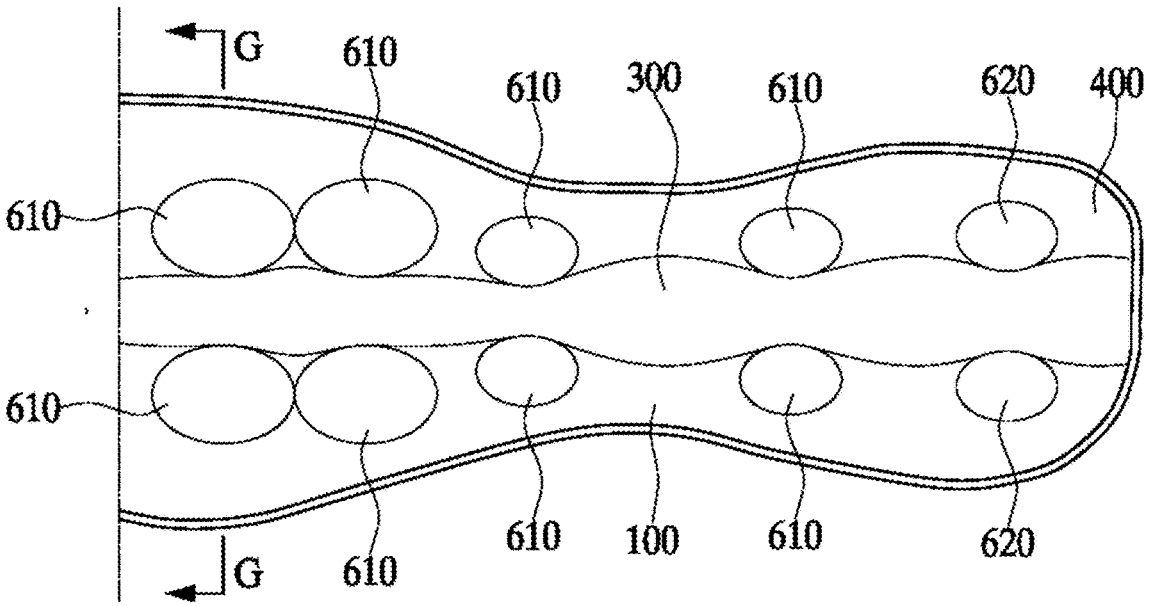


FIG. 10

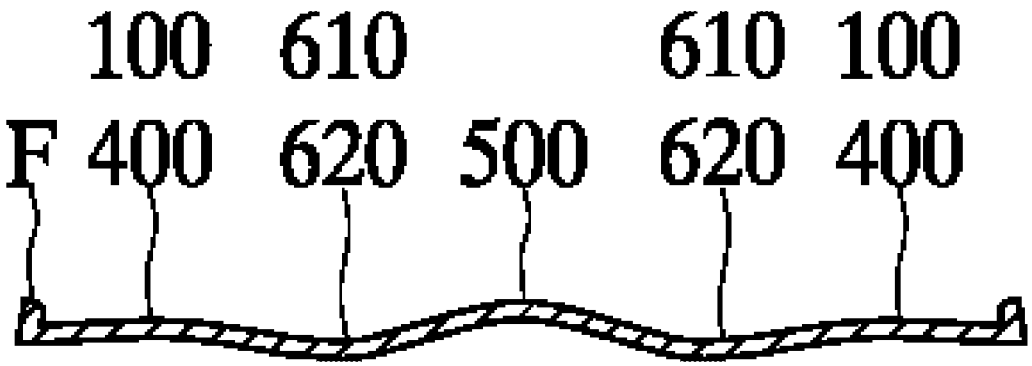


FIG. 11

SHOE OUTSOLE

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a shoe having an outsole and an insole, or a shoe having an outsole, an insole and a midsole. More particularly, the present invention relates to an outsole of a shoe enhancing propulsive force so as to increase speed of gait and running by delivering force of a wearer without slippage; enhancing more propulsive force by using force applied to the big toe as well as using force applied to the second toe, the third toe, the fourth toe and the little toe; obtaining self-sufficient buffering effect without being equipped with separate shock absorbing means by performing buffering action through a repeating process of downward elastic deformation and upward elastic restoration of a toe-corresponding part being formed upwardly inclined toward the front and a heel-corresponding part being formed upwardly inclined toward the rear when force such as the weight of a wearer and other forces are applied; having a plurality of shock absorbing parts on a sole-corresponding part and on a heel-corresponding part so as to obtain self-sufficient shock absorption effect; enabling stable gait and running by preventing from unbalance causing a fall, an ankle injury and a loss of propulsive force by gripping the foot in order not to fall when force delivered by a wearer is offset toward the left or the right; and achieving efficient fast running by helping the front of an outsole downwardly inclined toward the ground at the time of initial contact of fast running by offsetting the center.

Related Art

[0002] The most basic transportation means of human beings is gait and running.

[0003] Gait and running of a human being means movement of the center of gravity in terms of physics. In other words, the gait of a human being is moving the body forward by alternating left and right legs forward and shifting weight to a front foot in an orderly manner.

[0004] At the time of gait and running, a flexor muscle group and an extensor muscle group move countervailingly to each other, the left leg and the right leg repeating the same movement to each other, and an upper limb and a lower limb move to the front and to the rear opposite to each other so as to obtain smooth and efficient gait.

[0005] The human foot includes a sole **10**, toes: a big toe **21**, a second toe **22**, a third toe fourth toe **24**, and a little toe **25**, having corresponding recess of each toe **31**, **32**, **33**, **34**, **35**, which are located in between the sole and the front end of the sole, a heel **40** being located at the rear.

[0006] One cycle of a gait starts from the initial ground contact of a heel of a leg, lift up from the ground and then ends at the moment of contacting the ground again. The cycle of a gait is further classified as a stance phase (see FIG. **1**) wherein a foot contacts the ground, and a swing phase (see FIG. **2**) wherein a foot is off the ground and a body is propelled forward.

[0007] A stance phase occupies 60% of a cycle while a swing phase occupies 40% of a cycle.

[0008] A stance phase is further divided into a heel-strike phase, a foot-flat phase, mid-stance phase, a heel-off phase, and a toe-off phase (see FIG. **1**).

[0009] A heel-strike phase is a period when a heel **40** is contacting the ground. During the phase, force delivered by a wearer is concentrated on the heel **40** as shown with dark marking in the first picture from the left of FIG. **3**.

[0010] A foot flat phase is a period when a sole is contacting the ground which follows the heel striking the ground. In this phase, force delivered by a wearer is distributed on the heel **40** and a sole **10** as shown with dark marking in the second picture from the left of FIG. **3**.

[0011] A mid-stance phase is a period when the center of gravity is passing through the middle of the sole **10** after the sole contacts the ground. In this phase, force delivered by a wearer is distributed on the heel **40**, a sole **10**, and toes (**21**, **22**, **23**, **24**, **25**) as shown with dark marking in the third picture from the left of FIG. **3**.

[0012] A heel-off phase is a period when the heel **40** leaves the ground following the mid-stance phase. In this phase, force delivered by a wearer is distributed on the front portion of a sole **10** and toes (**21**, **22**, **23**, **24**, **25**) as shown with dark marking in the fourth picture from the left of FIG. **3**.

[0013] A toe-off phase is a period when toes (**21**, **22**, **23**, **24**, **25**) leave the ground. In this phase, force delivered by a wearer is distributed on the big toe **21** side of the front portion of a sole **10** and a big toe **21** as shown with dark marking in the fifth picture from the left of FIG. **3**.

[0014] A heel-strike phase, a foot flat phase, and mid-stance phase can be regarded as preparatory periods to obtain propulsive force while a heel-off phase and a toe-off phase can be regarded as periods to generate propulsive force.

[0015] Especially, the toe-off phase is a very important period for generating propulsive force since a kicking motion, a motion pushing the toes to the rear, takes place.

[0016] A swing phase is subdivided into a follow-through, a foot descent, and a forward swing (see FIG. **2**).

[0017] Meanwhile, a running cycle is similar to a gait cycle. However, the stance phase is subdivided into an initial contact, a mid-stance, and a propulsion while the swing phase is subdivided into a follow-through, a forward swing, and foot descent.

[0018] A difference between gait and running is that there is a double-support phase, with both feet in contact with the ground at the time of gait; there is a flight phase, with both feet not in contact with the ground at the time of running.

[0019] For cases of slow running such as jogging or a participation in a marathon, the stance phase in a running cycle is longer than the flight phase. As the speed of running is increased, as in the case of a 100-meter sprint, the stance phase becomes shorter.

[0020] Also, at the time of slow running, a heel contacts the ground first and the toes contact the ground later, as in the case of gait; at the time of fast running, a heel and a forefoot contact the ground right before the toe-off phase almost simultaneously or the heel descends to the ground during a period of a forefoot contacting the ground at the beginning until right before the toe-off phase.

[0021] For case of very fast running, only the forefoot (a front portion of the sole, and toes) contacts the ground from the initial contact phase to the propulsion phase.

[0022] It is known that human beings started to wear shoes 21,000 years ago, and thereafter the shoes having various shapes or functions have been developed persistently.

[0023] Types of shoes are classified depending on their shapes, materials, usages, and manufacturing methods. Basi-

cally, they can be classified into a shoe having a shoe sole and an upper such as dress shoes or sports shoes, and a shoe having a shoe sole and a strap such as slippers.

[0024] Most of a shoe sole is configured to have an outsole, midsole, and an insole, but it is possible to be configured to have an outsole and an insole.

[0025] An outsole is a member in contact with the ground; shock absorption function, light weight, and wear-resistance are required since it receives shocks directly from the ground; and a material such as natural rubber and synthetic rubber, foamed vulcanized rubber, foamed EVA (Ethylene Vinyl Acetate), or polyurethane is used.

[0026] A midsole is a member attached to the top surface of the outsole; an anti-twist function and a shock absorption function are required; and a material such as EVA (Ethylene Vinyl Acetate) sponge, Phylon, or polyurethane is used.

[0027] An insole is a member attached to the top surface of the midsole and is in contact with the foot sole; foot protection function is required; a material such as a latex foam, EVA (Ethylene Vinyl Acetate) sponge, or polyurethane is used.

[0028] Conventionally, since a toe-corresponding part of an outsole is flat, slippage between toes and toe-corresponding parts occurs in the process when a kicking motion, which pushes toes toward the rear, takes place at the time of the toe-off phase. Due to the slip, propulsive force is reduced which results in waste of energy.

[0029] Also, as shown in FIG. **3**, even though force exerted by a wearer is concentrated towards the big toe, the force is exerted to the second toe, the third toe, the fourth toe, and the little toe as well. While contact pressure on the toe-corresponding part incurred by the force exerted to the big toe is strong, contact pressure on the toe-corresponding part incurred by the force exerted to the second toe, the third toe, the fourth toe, and the little toe is weak or almost nothing.

[0030] Accordingly, force exerted to the big toe is used for propulsion, but force exerted to the second toe, the third toe, the fourth toe, and the little toe is not used for propulsion.

[0031] Consequently, only a force delivered to the big toe, which is some portion of the force exerted by a wearer, is used for propulsion, and force delivered to the second toe, the third toe, the fourth toe, and the little toe are wasted. Therefore, comparing with the force exerted, propulsive force is degraded, and energy is wasted.

[0032] Also, in case of running on a curved section in a track race or in case of switching directions quickly in ball games, force is delivered to the inner side or the outer side. At that time, only the edge of the inner side of the foot or only the edge of the outer side of the foot strongly butts against the shoe while the rest portion is floating in the shoe so that lateral- or medial-side slip occurs. Consequently, it causes not only degradation of propulsive force but also injury on foot and ankle of a wearer.

[0033] Especially, the little toe side is under strong pressure during the process of switching directions quickly in a track race or a ball game, a slip between a little toe and a toe-corresponding part occurs, and may cause not only a falling down due to loss of balance but also serious injury on the little toe portion.

[0034] Also, in general, constructing a shoe with a hard outsole is effective to enhance propulsive force, and constructing a shoe with a soft outsole is effective to have a buffering effect.

[0035] Accordingly, a conventional shoe is constructed by combining these two; adopting a hard outsole integrated with a separate buffering means such as a buffering rubber or a tubular type member.

[0036] However, the buffering effect is possibly achieved by the buffering means, but the effectiveness of a wearer's force delivered to the ground is degraded.

[0037] Consequently, a conventional shoe has a limit to satisfy both a function for delivering a wearer's force to the ground and a function for buffering at the same time.

[0038] Also, fast running comprises a stance phase, which includes an initial contact, a mid-stance, and a propulsion, and a swing phase, which includes a follow-through, a forward swing, and foot descent. At the time of initial contact, when a wearer set a foot on the ground, the toes contact the lower surface first. For the case of a conventional outsole, it is not helpful for performing initial contact movement because the center of gravity is located in the middle.

[0039] Therefore, it does not provide sufficient stability and propulsive force for fast running.

[0040] As a prior art, Korean Unexamined Patent No. 10-2011-0040653 (published on Apr. 20, 2011) "Shoe with Anti-Slip Part" (hereinafter, Prior Art 1) discloses a shoe having an anti-slip part which is upwardly protruded from the floor surface of an outsole and corresponds to the recessed area where the toes and the foot sole are connected.

[0041] The anti-slip part of Prior Art 1 is integrally formed on an outsole or is installed so as to slide in the longitudinal direction. Since there is a considerable gap between the toes and the recessed area, the recessed area does not fully butt against the anti-slip part, and touches and separates from the anti-slip part repeatedly so that the anti-slip part can possibly cause pain at the time of gait and running. Also, proximal phalanges, located inside of the recessed area between the toes and a sole, are squashed and cause severe pain.

[0042] Also, for the case of Prior Art 1, the toes are in contact with the flat plane of the top surface of an outsole so that the slippage, which occurs between toes and the top surface of the outsole at the time of gait and running, results in a loss of propulsive force.

[0043] Furthermore, for the case of Prior Art 1, the toes are in contact with the flat plane of the top surface of an outsole so that the foot of the shoe wearer tends to move toward the front at the time of gait and running. This can cause injury to the toenail of the shoe wearer.

[0044] On the other hand, Korean Registered Utility Model No. 20-0395056 (registered on Sep. 1, 2005) "Shock Absorbing Outsole" (hereinafter, Prior Art 2) discloses an insole which is configured to have a first shock absorbing portion and a second shock absorbing portion so as to prevent a user from various diseases of the musculoskeletal system by decreasing load delivered to the lumbar region and lower limbs with absorbing and distributing a shock delivered to the foot of a wearer; wherein a first shock absorbing portion being formed in a region including the location where the front portion of the metatarsus is contacted on the lower surface of the insole and the location where the big toe is contacted, and wherein a second shock absorbing portion being formed in a region including the location where a heel is contacted.

[0045] However, since the first and second shock absorbing portions of Prior Art 2 are protruded from the top surface of the insole, shock applied to the front portion of the sole

which corresponds to the metatarsus and shock applied to the heel which corresponds to calcaneus can be attenuated. Therefore, shock attenuation effect is degraded since shocks applied to the sole and toes except the front of a sole and the heel are not attenuated, and feeling of fit is degraded since the toes and the sole with the whole heel are not in tight contact with the top surface of the insole, resulting in a gap.

[0046] Also, slippage occurs between the foot of the shoe wearer and the insole, and the foot of shoe wearer tends to move toward the front at the time of gait and running as in the case of Prior Art 1.

DETAILED DESCRIPTION OF THE INVENTION

Technical Solution

[0047] An objective of the present invention is to provide a shoe outsole which enhances propulsive force and increases speed of gait and running by delivering a wearer's force to the ground through a shoe without slip.

[0048] Another objective of the present invention is to provide a shoe outsole which enhances propulsive force not only by using the force delivered to the big toe but also by using force delivered to the second toe, the third toe, the fourth toe, and the little toe.

[0049] Another objective of the present invention is to provide a shoe outsole having self-sufficient buffering effect without being equipped with separate shock absorbing means by performing buffering action through a repeating process of downward elastic deformation and upward elastic restoration of a toe-corresponding part being formed upwardly inclined toward the front and a heel-corresponding part being formed upwardly inclined toward the rear when force such as the weight of the foot wearer and other forces are applied.

[0050] Another objective of the present invention is to provide a shoe outsole having a plurality of shock absorbing parts on a sole-corresponding part and on a heel-corresponding part so as to obtain self-sufficient shock absorption effect.

[0051] Another objective of the present invention is to provide a shoe outsole enabling stable gait and running by preventing from unbalance causing a fall, an ankle injury or a loss of propulsive force by gripping a foot in order not to fall down when force delivered by a wearer is offset toward the left or the right.

[0052] Another objective of the present invention is to provide a shoe outsole achieving efficient fast running by helping the front of an outsole downwardly inclined toward the ground at the time of initial contact of fast running by offsetting the center.

[0053] In order to achieve the objectives mentioned above, a shoe having an outsole and an insole, or a shoe having an outsole, an insole and a midsole includes a sole-corresponding part corresponding to the foot sole of a wearer, a toe-corresponding part corresponding to the toes of a wearer at the front of the sole-corresponding part, a heel-corresponding part corresponding to the heel of a wearer at the rear of the sole-corresponding part, and a propulsion strengthening part corresponding to the plantar arch of a wearer, being formed with a convex shape in between the front end of the sole-corresponding part and the rear end of the toe-corresponding part, and having an area corresponding to the big toe recess lower than an area corresponding to the little toe recess.

[0054] The propulsion strengthening part is preferably configured to have the higher surface of the propulsion strengthening part is convexly embossed and the lower surface of the propulsion strengthening part is concavely embossed.

[0055] The toe-corresponding part is formed upwardly inclined toward the front.

[0056] The heel-corresponding part is formed upwardly inclined toward the rear.

[0057] The rolling function part can be included further which has a convex top surface being formed along the centerline passing through a middle portion of the sole-corresponding part and the toe-corresponding part in the left-to-right direction.

[0058] The rolling function part is preferably configured to have the higher surface of the propulsion strengthening part convexly embossed and the lower surface of the propulsion strengthening part concavely embossed.

[0059] A plurality of shock-absorbing functional parts with the convex higher surface and the concave lower surface can be further included.

Advantages of the Invention

[0060] In accordance with a shoe outsole of the present invention, a propulsion strengthening part is provided between a sole-corresponding part and a toe-corresponding part so as to enhance propulsive force for delivering a wearer's force to the ground sufficiently without slip by the shoe.

[0061] Also, in accordance with a shoe outsole of the present invention, a propulsion strengthening part is provided between a sole-corresponding part and a toe-corresponding part that enhances propulsive force not only by using the force delivered to the big toe but also by using force delivered to the second toe, the third toe, the fourth toe, and the little toe.

[0062] Also, in accordance with a shoe outsole of the present invention, self-sufficient buffering effect without being equipped with separate shock absorbing means is obtained by performing buffering action through a repeating process of downward elastic deformation and upward elastic restoration of a toe-corresponding part being formed upwardly inclined toward the front and a heel-corresponding part being formed upwardly inclined toward the rear when force is applied by a wearer.

[0063] Also, in accordance with a shoe outsole of the present invention, self-sufficient buffering effect is achieved with a plurality of shock-absorbing functional parts which is formed in a heel-corresponding part and repeats downward elastic deformation and upward elastic restoration depending on the force applied at the time of gait and running.

[0064] Also, in accordance with a shoe outsole of the present invention, efficient fast running is achieved by helping the front of a sole-corresponding part and toe-corresponding part downwardly inclined toward the ground at the time of initial contact of fast running by offsetting the center of gravity toward the front of the sole-corresponding part and the toe-corresponding part.

BRIEF DESCRIPTION OF THE DRAWINGS

[0065] FIG. **1** illustrates a stance phase of a gait cycle.

[0066] FIG. **2** illustrates a swing phase of a gait cycle.

[0067] FIG. **3** illustrates a front view and a bottom view of a leg in a stance phase.

[0068] FIG. **4** illustrates a side view of a foot.

[0069] FIGS. **5** to **11** illustrate a shoe outsole in accordance with the preferred embodiment of the present invention.

[0070] FIG. **5** is an isometric view of a shoe outsole in accordance with the preferred embodiment of the present invention.

[0071] FIG. **6** is a plan view of a shoe outsole in accordance with the preferred embodiment of the present invention.

[0072] FIG. **7** is a cross-sectional view taken along line A-A of FIG. **6**.

[0073] FIG. **8** is a plan view of the toe-corresponding part and the propulsion strengthening part.

[0074] FIG. **9** is a cross-sectional view taken along line B-B, line C-C, line D-D, line E-E and line F-F of FIG. **8**.

[0075] FIG. **10** is a plan view of a sole-corresponding part and a heel-corresponding part.

[0076] FIG. **11** is a cross-sectional view taken along line G-G of FIG. **10**.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0077] Hereinafter, a shoe outsole in accordance with a preferred embodiment of the present invention will be described with reference to the accompanying drawings.

[0078] To facilitate understanding, the exemplary embodiment illustrates and describes only an outsole by omitting illustration and description of an insole and a midsole even though the present invention can be applied to a shoe including an outsole and an insole as well as a shoe including an outsole, an insole, and a midsole.

[0079] In the following, five toes are denoted as the big toe **21**, the second toe **22**, the third toe **23**, the fourth toe **24**, and the little toe **25** when described individually; denoted as toes **20** when described collectively. Five recesses between the front end of a sole **10** and toes **20** are denoted as a big toe recess **31**, a second toe recess **32**, a third toe recess **33**, a fourth toe recess **34**, and a little toe recess **35** when described individually; they are denoted as recesses **30** when described collectively.

[0080] FIGS. **4** to **11** illustrate a shoe outsole in accordance with a preferred embodiment of the present invention. FIGS. **4** to **11** illustrate a shoe outsole for the left foot.

[0081] As illustrated in FIGS. **4** to **11**, an outsole OS in accordance with a preferred embodiment of the present invention has an outline corresponding to a foot projected to a plane.

[0082] The outsole OS is configured to comprise a sole-corresponding part **100** being formed in the middle portion to correspond to the sole **10** of a wearer, a toe-corresponding part **200** being formed at the front end of the sole-corresponding part **100** to correspond to toes **20** of a wearer, a propulsion strengthening part **300** being formed in between the sole-corresponding part **100** and the toe-corresponding part **200** with a convex higher surface, and a heel-corresponding part **400** being formed at the rear end of the sole-corresponding part **100** to correspond to a heel **40**.

[0083] An outsole OS corresponding to a projected area of a foot can be formed to have an area large enough to cover the marginal area for binding an upper or a band. An upwardly protruded edge F is provided on an outline of the outsole OS.

[0084] The sole-corresponding part **100** can be formed as a curve surface corresponding to the sole **10**.

[0085] The toe-corresponding part **200** is configured to make the toes of a wearer such as the big toe **21**, the second toe **22**, the third toe **23**, the fourth toe **24** and the little toe **25** butt against the toe-corresponding part **200** by forming a portion corresponding to the big toe **21** of a wearer that is lower than a portion corresponding to the little toe **25** of a wearer.

[0086] Accordingly, the toes of a wearer such as the big toe **21**, the second toe **22**, the third toe **23**, the fourth toe **24** and the little toe **25** are in close contact with the toe-corresponding part **200** with uniformly distributed force at the time of gait or running so that propulsive force applied to an area corresponding to the big toe **21** of a toe-corresponding part **200** as well as propulsive force applied to areas corresponding to a second toe **22**, a third toe **23**, a fourth toe **24** and a little toe **25** are used for propulsion in toe-off period of gait cycle and the propulsion period of running, resulting in reinforcing of propulsive force, enabling powerful and fast gait or running, and reducing energy consumption.

[0087] Also, the toe-corresponding part **200** being formed upwardly inclined toward the front and the heel-corresponding part **400** being formed upwardly inclined toward the rear are elastically deformed downward and attenuate shock delivered when the force of a wearer is applied, and elastically restored upward and act as a force raising a foot of a wearer resulting in helping to raise the foot when the force of a wearer is diminished. Thus, brisk gait or running is enabled, and energy consumption is reduced.

[0088] Since the toe-corresponding part **200** is formed upwardly inclined toward the front, a phenomenon of pushing a foot of a shoe wearer forward at the time of gait or running is prevented so that an injury to a toenail of the shoe wearer can be prevented.

[0089] The propulsion strengthening part **300** can be formed with a higher surface convex in an upward direction. However, it is preferable to form a higher surface upwardly convex and a lower surface downwardly concave in order to reduce weight.

[0090] The propulsion strengthening part **300** is configured to have the height of the portion corresponding to the big toe recess **31** lower than that of the portion corresponding to the little toe recess **35** in accordance with the shape of recesses **30** of a wearer while the width of the portion corresponding to the big toe recess **31** is narrower than that of the portion corresponding to the little toe recess **35** so as to make the big toe recess **31**, the second toe recess **32**, the third toe recess **33**, the fourth toe recess **34**, and the little toe recess **35** in close contact with the propulsion strengthening part **300**.

[0091] Accordingly, the toes of a wearer such as the big toe **21**, the second toe **22**, the third toe **23**, the fourth toe **24** and the little toe **25** are locked with a propulsion strengthening part **300** during a toe-off period of the gait cycle and the propulsion period of running, and are not able to slip rearward so that all propulsive force is transmitted without a loss, and propulsive force is enhanced. The amount of

force enhanced is used for raising the speed of gait or running, and reduces energy consumption of a wearer.

[0092] Since the toe-corresponding part **200** is configured to be in close contact with the big toe **21**, the second toe **22**, the third toe **23**, the fourth toe **24** and the little toe **25**; and the propulsion strengthening part **300** is configured to be in close contact with the big toe recess **31**, the second toe recess **32**, the third toe recess **33**, the fourth toe recess **34**, and the little toe recess **35**, the little toe recess **35** is in close contact with a toe-corresponding part **200**, and the little toe recess **35** is in close contact with a propulsion strengthening part **300** even when a strong force is applied toward the little toe due to ground condition or circumstances of gait or running so that a wearer maintains balance or is prevented from suffering an ankle injury.

[0093] On the other hand, a shoe outsole in accordance with the exemplary embodiment further includes a rolling functional part **500** having a convex top along a centerline which passes a middle part of the sole-corresponding part **100** and the heel-corresponding part **400** in the left-to-right direction.

[0094] The rolling functional part **500** can be configured to be formed with a convex higher surface. However, it is preferable to form a convex higher surface and a concave lower surface in order to reduce the weight of an outsole OS.

[0095] The rolling functional part **500** makes a foot roll with respect to an outsole OS when force eccentric to the left or the right of the rolling functional part **500** is applied due to ground surface condition or circumstances of gait or running.

[0096] Accordingly, the left half or the right half of a sole **10** and the heel of a wearer is in tight contact with the left half or the right half of sole-corresponding part **100** and heel-corresponding part **400**; the rolling functional part **500** holds a sole **10** and a heel **40** so as to prevent slipping to the right or to the left. Therefore, a wearer can maintain balance, not suffer an ankle injury, and avoid a loss of propulsive force so as to enable stable gait or running.

[0097] In the above case, toes **20** and recesses **30** are in tight contact with the big toe **21**, the second toe **22**, the big toe recess **31**, and the second toe recess **32** which are located on the left, or the fourth toe **24**, the little toe **25**, the fourth toe recess **34**, and the little toe recess **35** which are located on the right are in close contact with the left half or the right half so that a wearer can maintain balance, not suffer an ankle injury, and avoid a loss of propulsive force so as to enable stable gait or running.

[0098] For the case of a soccer shoe application, a plurality of protruding cleats S as shown in the figures can be formed on a bottom surface of a shoe outsole OS in accordance with the preferred embodiment, and various types of bumps and dips or cleats can be formed depending on the type of application.

[0099] A shoe outsole OS in accordance with a preferred embodiment further includes a plurality of shock absorbing functional parts **610** formed in a sole-corresponding part **100** and a plurality of shock absorbing functional parts **620** formed in a heel-corresponding part **400** (see FIG. **10** and FIG. **11**).

[0100] As illustrated, the shock absorbing functional parts **610** formed in a sole-corresponding part **100** are configured to have 4 pairs arranged on the left and on the right, and the shock absorbing functional parts **620** formed in a heel-corresponding part **400** are configured to have a pair arranged on the left and on the right. The number of pairs described herein is not limited to the embodiment and can be increased or decreased depending on the size of the shoe.

[0101] Also, a cross section of shock-absorbing functional parts **610** formed at the front end of a sole-corresponding part **100** is shown in FIG. **11**, and other shock absorbing functional parts **610**, **620** can be considered to have equivalent cross-sectional shapes.

[0102] The shock absorbing functional parts **610**, **620** are configured to have a concave high surface and a convex low surface.

[0103] The shock absorbing functional parts **610**, **620** repeat a process of downward elastic deformation when the force of a wearer is applied on a sole-corresponding part **100** and a heel-corresponding part **400**, and upward elastic restoration when the force of a wearer is diminished. Shock absorption is made through the process, and shock delivered to a wearer is minimized.

[0104] On the other hand, the front end of a sole-corresponding part **100**, and a toe-corresponding part **200**, and a propulsion strengthening part **300** hit the ground prior to a heel **40** during fast running. Unnecessary force can be consumed because a wearer has to bend the foot downwardly inclined toward the front by putting force on the ankle.

[0105] In accordance with this embodiment, a shoe outsole is configured to shift the center of gravity toward the front of a sole-corresponding part **100** and a toe-corresponding part **200**.

[0106] Thus, a wearer avoids force consumption during fast running by making the front of a sole-corresponding part **100**, a toe-corresponding part **200**, and a propulsion strengthening part **300** downwardly inclined without putting force on the ankle.

[0107] In order to configure the center of gravity of an outsole OS offset toward the front of a sole-corresponding part **100**, a toe-corresponding part **200**, and a propulsion strengthening part **300**, bumps and dips or cleats formed on the bottom surface are arranged intensively to the front of a sole-corresponding part **100** and a toe-corresponding part **200**.

[0108] The embodiment described above is exemplary, and any person skilled in the art could make modifications and variations within the scope of not deviating from intrinsic features of the present invention. Therefore, the disclosed embodiment is intended not to limit but to describe the technical idea of the present invention, and does not limit the technical idea of the present invention in scope. The protection scope of the present invention should be interpreted in accordance with the following claims, and all the technical ideas within the equal scope should be interpreted as being included in the right scope of the present invention.

What is claimed is:

1. A shoe outsole of a shoe having an outsole and an insole, or a shoe having an outsole, an insole, and a midsole, the shoe outsole comprising:

a sole-corresponding part corresponding to the foot sole of a wearer;

a toe-corresponding part corresponding to the toes of a wearer at the front of the sole-corresponding part;

a heel-corresponding part corresponding to the heel of a wearer at the rear of the sole-corresponding part; and

a propulsion strengthening part corresponding to the plantar arch of a wearer, being formed with a convex

shape in between the front end of the sole-corresponding part and the rear end of the toe-corresponding part, and having an area corresponding to the big toe recess lower than an area corresponding to the little toe recess.

2. The shoe outsole of claim **1**, wherein

the propulsion strengthening part is characterized in that the higher surface of the propulsion strengthening part is convexly embossed and the lower surface of the propulsion strengthening part is concavely embossed.

3. The shoe outsole of claim **1**, wherein

the toe-corresponding part is characterized in that it is formed upwardly inclined toward the front.

4. The shoe outsole of claim **1**, wherein

the heel-corresponding part is characterized in that it is formed upwardly inclined toward the rear.

5. The shoe outsole of claim **1**, further comprising:

a rolling function part which has a convex top surface being formed along the centerline passing though a middle portion of the sole-corresponding part and the toe-corresponding part in the left-to-right direction.

6. The shoe outsole of claim **5**, wherein

the rolling function part is characterized in that the higher surface of the rolling function part is convexly embossed and the lower surface of the rolling function part is concavely embossed.

7. The shoe outsole of claim **1**, further comprising:

a plurality of shock absorbing functional parts is formed a convex higher surface and a concave lower surface.

8. The shoe outsole of claim **1**, wherein

the propulsion strengthening part is characterized in that the width of a portion corresponding to the big toe recess is narrower than the width of a portion corresponding to the little toe recess.

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