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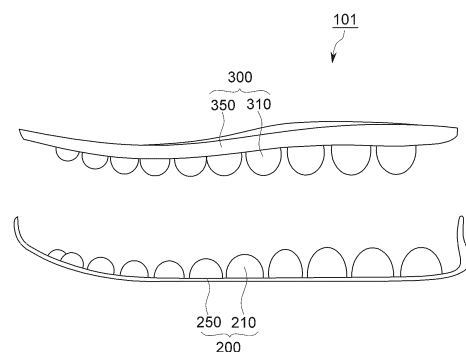
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(54) **FOOTWEAR**

(57) Footwear is described that includes a first sole having a first base portion configured to come into contact with the ground surface, and a plurality of first protrusion portions protruding from the base portion in a direction opposite to the ground surface. The footwear also includes a second sole having a second base portion bonded to ends of the plurality of first protrusion portions, and a plurality of second protrusion portions protruding from the second base portion in the direction of the first base portion and having ends bonded to the first base portion.

Fig. 2



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## Description

### [Technical Field]

**[0001]** The present disclosure relates to footwear, and more particularly, to footwear with improved impact absorbability and elastic restoring force.

### [Background Art]

**[0002]** In general, footwear serves to protect a person's foot. The footwear protects the foot from outside environment when the person walks or runs. However, a significant large amount of load is applied when the person walks or runs. Using a pressure plate and analyzing a repulsive force against the ground surface while the person runs indicates that a magnitude of vertical pressure between the ground surface and the foot is approximately 2 to 3 times a body weight.

**[0003]** Therefore, a sole of the footwear needs to have a function of mitigating impact applied to the bottom of the foot. If the sole of the footwear cannot sufficiently absorb impact transmitted from the ground surface while the person walks or runs, the person may experience a degenerative change of joint or back pain.

**[0004]** Various buffer members are used for the sole of the footwear to sufficiently absorb a significant amount of impact applied to the bottom of the foot when the person walks or runs so that the skeletal muscle is not strained. Alternatively, hardness of the sole of the footwear is reduced to sufficiently absorb impact.

**[0005]** However, the sole of the footwear is required to have impact absorbability for absorbing impact that needs to be reduced when the person steps on the ground surface, and the sole of the footwear is also required to have repulsive elasticity that needs to be increased when the person lifts his/her foot off the ground surface. However, the impact absorbability and repulsive elasticity are antinomical properties because a repulsive force against the ground surface decreases as the sole of the footwear absorbs impact.

**[0006]** Because a sole of footwear in the related art performs a simple buffer function depending on impact absorbability of the material, it is difficult to improve repulsive elasticity and durability of the sole when the sole of the footwear is manufactured by using a material excellent in impact absorbability.

**[0007]** In particular, in a case in which the sole of the footwear is manufactured by using a material excellent in impact absorbability, a wearer's ankle may be easily bent when the wearer performs a strenuous motion. When the person walks or takes an exercise over a long period of time in a state in which the person has adduction, the person easily feels fatigued. This situation is a main cause of injuries to the ankle or knee.

**[0008]** Therefore, the improvement of both the impact absorbability and repulsive elasticity, which are antinomical properties, causes problems in that the structure of

the sole of the footwear is complicated, a weight is increased, and productivity deteriorates. For example, running shoes may be manufactured by applying air tubes and injection-molding structures to improve impact absorbability and repulsive elasticity. However, because at least about six components are inserted into a shoe insert, an insole, and a sole of the running shoe, there are problems in that a weight increases, and the production process is very complicated.

### [Disclosure]

### [Technical Problem]

**[0009]** The present disclosure provides lightweight footwear with improved impact absorbability, repulsive elasticity, and durability.

### [Technical Solution]

**[0010]** Footwear according to the present disclosure includes a first sole having a first base portion configured to come into contact with the ground surface, and a plurality of first protrusion portions protruding from the base portion in a direction opposite to the ground surface and includes a second sole having a second base portion bonded to ends of the plurality of first protrusion portions, and a plurality of second protrusion portions protruding from the second base portion in a direction of the first base portion and having ends bonded to the first base portion.

**[0011]** The plurality of first protrusion portions and the plurality of second protrusion portions may each have a shape having a horizontal cross-sectional area that increases in a direction in which the plurality of first protrusion portions and the plurality of second protrusion portions each protrude.

**[0012]** In addition, the plurality of first protrusion portions and the plurality of second protrusion portions may each include a hemispherical shape.

**[0013]** In addition, the plurality of first protrusion portions and the plurality of second protrusion portions may each have a hollow hemispherical shape.

**[0014]** Further, the plurality of first protrusion portions may have a hollow hemispherical shape, a portion of the hollow hemispherical shape, which faces the ground surface, may be opened, and an inner surface of the hollow hemispherical shape may be exposed to the ground surface.

**[0015]** The first sole and the second sole may be different in hardness from each other.

**[0016]** The plurality of first protrusion portions or the plurality of second protrusion portions, which has relatively high hardness among the plurality of first protrusion portions and the plurality of second protrusion portions, may be formed along an edge of the first base portion or the second base portion, and the plurality of first protrusion portions or the plurality of second protrusion portions

tions, which has relatively low hardness among the plurality of first protrusion portions and the plurality of second protrusion portions, may be disposed in spaces between the plurality of first protrusion portions or the plurality of second protrusion portions having relatively high hardness.

**[0017]** The plurality of first protrusion portions or the plurality of second protrusion portions, which has relatively low hardness among the plurality of first protrusion portions and the plurality of second protrusion portions, may have relatively higher elasticity than the plurality of first protrusion portions or the plurality of second protrusion portions having relatively high hardness.

**[0018]** The first base portion may have a plurality of first connection portions configured to connect all or some of the plurality of first protrusion portions, and the second base portion may have a plurality of second connection portions configured to connect all or some of the plurality of second protrusion portions.

**[0019]** The plurality of first connection portions may each have a smaller height than each of the plurality of first protrusion portions, a height of each of the plurality of first connection portions may decrease as a distance from each of the plurality of first protrusion portions increases, the plurality of second connection portions may each have a smaller height than each of the plurality of second protrusion portions, and a height of each of the plurality of second connection portions may decrease as a distance from each of the plurality of second protrusion portions increases.

**[0020]** The plurality of first connection portions may connect the plurality of first protrusion portions in a longitudinal direction or a width direction of the first base portion, and the plurality of second connection portions may connect the plurality of second protrusion portions in a width direction or a longitudinal direction of the second base portion. Further, the plurality of first connection portions and the plurality of second connection portions may be formed in a direction in which the plurality of first connection portions and the plurality of second connection portions intersect one another.

**[0021]** The first sole may further include a first elastic reinforcement portion protruding from the first base portion in a direction of the second base portion. The second sole may further include a second elastic reinforcement portion protruding from the second base portion in a direction of the first base portion and having an end facing and bonded to an end of the first elastic reinforcement portion.

**[0022]** The first elastic reinforcement portion and the second elastic reinforcement portion may be disposed between the plurality of first protrusion portions and the plurality of second protrusion portions.

**[0023]** One of or both the first elastic reinforcement portion and the second elastic reinforcement portion may each have a hemispherical shape.

## [Advantageous Effects]

**[0024]** According to the embodiments of the present disclosure, the footwear may be lightweight and have improved impact absorbability, repulsive elasticity, and durability.

**[0025]** In addition, according to the embodiments of the present disclosure, the footwear may also effectively prevent the wearer's ankle from being sprained and suppress adduction.

**[0026]** In addition, according to the embodiments of the present disclosure, the footwear may also stably withstand impact corresponding to several times the wearer's body weight, the motion in one direction, and the lateral force generated by a rapid direction switching operation.

## [Description of Drawings]

### [0027]

FIG. 1 is a side view of footwear according to a first embodiment of the present disclosure.

FIG. 2 is an exploded side view of first and second soles of the footwear in FIG. 1.

FIG. 3 is a top plan view of the first sole of the footwear in FIG. 1.

FIG. 4 is a top plan view of the second sole of the footwear in FIG. 1.

FIG. 5 is a top plan view illustrating the first and second soles of the footwear in FIG. 1.

FIG. 6 is an exploded side view of footwear according to a modified example of the first embodiment of the present disclosure.

FIG. 7 is a side view of footwear according to a second embodiment of the present disclosure.

FIG. 8 is an exploded side view of first and second soles of the footwear in FIG. 6.

FIG. 9 is a top plan view of the first sole of the footwear in FIG. 6.

FIG. 10 is a top plan view of the second sole of the footwear in FIG. 6.

FIG. 11 is a top plan view illustrating the first and second soles of the footwear in FIG. 6.

FIG. 12 is a cross-sectional view taken along line XII-XII in FIG. 10.

## [Mode for Invention]

**[0028]** Hereinafter, embodiments of the present disclosure will be described in detail with reference to the accompanying drawings so that those with ordinary skill in the art to which the present disclosure pertains may easily carry out the embodiments. The present disclosure may be implemented in various ways and is not limited to the embodiments described herein.

**[0029]** In addition, the constituent elements having the same configurations in several embodiments will be assigned with the same reference numerals and represent-

atively described in a first embodiment, and only the constituent elements that are different from the constituent elements according to the first embodiment will be described in the second embodiment.

**[0030]** It is noted that the drawings are schematic and are not illustrated based on actual scales. Relative dimensions and proportions of parts illustrated in the drawings are exaggerated or reduced in size for the purpose of clarity and convenience in the drawings, and any dimension is just illustrative but not restrictive. The same reference numerals designate the same structures, elements or components illustrated in two or more drawings to exhibit similar characteristics.

**[0031]** Embodiments of the present disclosure illustrate ideal embodiments of the present disclosure in detail. As a result, various modifications of the drawings are expected. Therefore, the embodiments are not limited to specific forms in regions illustrated in the drawings, and for example, include modifications of forms by the manufacture thereof.

**[0032]** Hereinafter, footwear 101 according to a first embodiment of the present disclosure will be described with reference to FIGS. 1 to 5.

**[0033]** In addition, in the present specification, for convenience of description, an upper portion of the footwear 101 is excluded from the description. The upper portion may be formed in various shapes and made of various materials known to those skilled in the art. The upper portion may be coupled to a first sole 200 and a second sole 300, which will be described below, by various methods.

**[0034]** As illustrated in FIGS. 1 to 5, the footwear 101 may include the first sole 200 and the second sole 300 according to the first embodiment of the present disclosure.

**[0035]** The first sole 200 may include a first base portion 250 and a plurality of first protrusion portions 210. In this case, the first base portion 250 and the plurality of first protrusion portions 210 may be integrated.

**[0036]** The first base portion 250 may be configured to come into contact with the ground surface. Further, a tread may be formed on one surface of the first base portion 250, which comes into contact with the ground surface to improve a contact force between the first base portion 250 and the ground surface.

**[0037]** The plurality of first protrusion portions 210 may protrude from the first base portion 250 in a direction opposite to the ground surface, i.e., protrude from the other surface opposite to one surface that comes into contact with the ground surface.

**[0038]** In addition, in the first embodiment of the present disclosure, the plurality of first protrusion portions 210 may be formed along an edge of the first base portion 250.

**[0039]** The second sole 300 may include a second base portion 350 and a plurality of second protrusion portions 310. In this case, the second base portion 350 and the plurality of second protrusion portions 310 may be

integrated.

**[0040]** The second base portion 350 may be bonded to ends of the plurality of first protrusion portions 210 of the first sole 200. That is, one surface of the second base portion 350 is bonded to the ends of the plurality of first protrusion portions 210, and the other surface of the second base portion 350 faces the bottom of the foot of the wearer.

**[0041]** The plurality of second protrusion portions 310 may protrude in a direction from the second base portion 350 to the first base portion 250. Further, ends of the plurality of second protrusion portions 310 may be bonded to the first base portion 250. That is, the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310 may be disposed in a staggered manner.

**[0042]** In addition, in the first embodiment of the present disclosure, the plurality of second protrusion portions 310 of the second sole 300 may be disposed in spaces between the plurality of first protrusion portions 210 of the first sole 200, i.e., spaces surrounded by the plurality of first protrusion portions 210.

**[0043]** In addition, the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310 may each have a shape having a horizontal cross-sectional area that increases in the direction in which the protrusion portion protrudes. For example, the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310 may each include a hemispherical shape. The hemispherical shape, which the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310 may each have, is a structure that may very physically efficiently implement impact absorption and restoration. For example, balls used for all ball games most quickly absorb impact at any angle and are most efficiently restored circularly. However, if the ball is polyhedral instead of circular, an edge that connects surfaces most quickly bursts, and a restored shape is not uniform in accordance with angles of the surfaces and collision angles. Therefore, in a case in which the sole of the footwear is manufactured to have a spherical shape, it is possible to effectively improve both impact absorbability and repulsive elasticity. However, if the sole has the spherical shape, a contact area between the sole and the ground surface inevitably decreases, which decreases the contact force of the footwear.

**[0044]** In contrast, in the first embodiment of the present disclosure, the first sole 200 and the second sole 300 are manufactured to have the first protrusion portion 210 and the second protrusion portion 310 each having a hemispherical structure made by cutting the spherical structure in half. Further, the end of the first protrusion portion 210 and the end of the second protrusion portion 310 are respectively bonded to the second base portion 350 and the first base portion 250 so that cut surfaces of the hemispherical structures are directed in opposite directions.

**[0045]** Therefore, the footwear 101 according to the

first embodiment of the present disclosure may effectively improve both the impact absorbability and repulsive elasticity and sufficiently ensure the contact area with the ground surface.

**[0046]** In addition, in the footwear 101 according to the first embodiment of the present disclosure, the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310 are disposed in a staggered manner, such that the durability and strength may be improved. Accordingly, and the bottom of the foot of the wearer may be stably supported.

**[0047]** However, a junction area between the first protrusion portion 210 and the second base portion 350 is inevitably smaller than a junction area between the second protrusion portion 310 and the first base portion 250 in the structure in which the end of the first protrusion portion 210 and the end of the second protrusion portion 310 are bonded to the second base portion 350 and the first base portion 250 so that the cut surfaces of the hemispherical structures are directed in the opposite directions. Therefore, if the end of the first protrusion portion 210 and the end of the second protrusion portion 310 are respectively bonded to the second base portion 350 and the first base portion 250 by a general bonding agent, the end of the first protrusion portion 210 and the end of the second protrusion portion 310 may separate from the second base portion 350 or the second base portion 250 without withstanding a strenuous motion.

**[0048]** Therefore, in the first embodiment of the present disclosure, the end of the first protrusion portion 210 and the end of the second protrusion portion 310 may be bonded to the second base portion 350 and the first base portion 250 by a high-frequency bonding method.

**[0049]** The basic principle of the high-frequency bonding method is to dielectrically heat materials to be bonded. Two materials to be bonded by a high-frequency machine press is placed between an electrode and a surface plate, and the materials are simultaneously pressed while being heated by being vibrated to melting points of the materials by high frequency waves, such that the materials are melted together and strongly welded. Because the high-frequency bonding method quickly heats the materials within several seconds, the high-frequency bonding method may strongly weld the materials while minimizing a loss of the materials.

**[0050]** When the end of the first protrusion portion 210 and the end of the second protrusion portion 310 are bonded to the second base portion 350 and the first base portion 250 by using the high-frequency bonding method as described above, the footwear may withstand impact corresponding to several times the wearer's body weight, the motion in one direction, and the lateral force generated by a rapid direction switching operation.

**[0051]** However, the first embodiment of the present disclosure is not necessarily limited thereto. The end of the first protrusion portion 210 and the end of the second protrusion portion 310 may be bonded to the second base portion 350 and the first base portion 250 by various

methods using a bonding agent or the like.

**[0052]** Meanwhile, in FIGS. 1 and 5, the plurality of first protrusion portions 210 of the first sole 200 is formed along the edge of the first base portion 250, and the plurality of second protrusion portions 310 of the second sole 300 is disposed in the spaces between the plurality of first protrusion portions 210. However, the first embodiment of the present disclosure is not limited thereto. Contrary to the configuration illustrated in FIGS. 1 and 5, the plurality of second protrusion portions 310 of the second sole 300 may be formed along an edge of the second base portion 350, and the plurality of first protrusion portions 210 of the first sole 200 may be disposed in spaces between the plurality of second protrusion portions 310.

**[0053]** In addition, in the first embodiment of the present disclosure, the first sole 200 and the second sole 300 are manufactured to be different in hardness from each other. For example, the first sole 200 may have relatively low elasticity but have high strength and hardness, and the second sole 300 may have relatively low strength and hardness but have high elasticity, or vice versa.

**[0054]** In addition, the plurality of first protrusion portions 210 or the plurality of second protrusion portions 310, which has relatively high hardness among the plurality of first protrusion portions 210 of the first sole 200 and the plurality of second protrusion portions 310 of the second sole 300, may be formed along the edge of the first base portion 250 or the second base portion 350. Further, the plurality of first protrusion portions 210 or the plurality of second protrusion portions 310, which has relatively low hardness among the plurality of first protrusion portions 210 of the first sole 200 and the plurality of second protrusion portions 310 of the second sole 300, may be disposed in the spaces between the plurality of first protrusion portions 210 or the plurality of second protrusion portions 310 having relatively high hardness. For example, FIGS. 1 and 5 illustrate a structure in which the plurality of first protrusion portions 210 has relatively higher hardness than the plurality of second protrusion portions 310 and is formed along the edge of the first base portion 250, and the plurality of second protrusion portions 310 is disposed in the spaces between the plurality of first protrusion portions 210.

**[0055]** In addition, the plurality of first protrusion portions 210 or the plurality of second protrusion portions 310, which has relatively low hardness among the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310, may have relatively higher elasticity than the plurality of first protrusion portions 210 or the plurality of second protrusion portions 310 having relatively high hardness.

**[0056]** The plurality of first protrusion portions 210 or the plurality of second protrusion portions 310 is disposed along the edge of the footwear 101 having relatively high hardness as described above, which makes it possible to improve the durability and strength of the footwear 101, to inhibit the footwear 101 from being easily tilted

and the wearer's ankle from being sprained, and to suppress adduction.

**[0057]** In addition, the plurality of first protrusion portions 210 or the plurality of second protrusion portions 310, which has relatively low hardness and high elasticity, is disposed in the spaces between the plurality of first protrusion portions 210 or the plurality of second protrusion portions 310 having relatively high hardness, which makes it possible to disperse a load and improve the impact absorbability and repulsive elasticity.

**[0058]** Meanwhile, the first sole 200 and the second sole 300 may vary in hardness depending on the type of footwear. The footwear 101 may be used for various purposes such as running shoes, walking shoes, basketball shoes, golf shoes, hiking shoes, and various types of sports shoes. Depending on the type of footwear 101, the first sole 200 may have relatively high hardness, or the second sole 300 may have relatively high hardness.

**[0059]** In addition, in the first embodiment of the present disclosure, the plurality of first protrusion portions 210 may be spaced apart from one another with predetermined empty spaces interposed therebetween, and the plurality of second protrusion portions 310 may also be spaced apart from one another with predetermined empty spaces interposed therebetween. In this case, the predetermined empty spaces are spaces in which the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310, which each have a hemispherical shape, may spread when the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310 are buckled by receiving pressure. Therefore, a size of the empty space may be variously set depending on a size of the first protrusion portion 210, a size of the second protrusion portion 310, and a degree to which the first protrusion portion 210 and the second protrusion portion 310 are deformed.

**[0060]** In addition, in the first embodiment of the present disclosure, the edge of the first base portion 250 of the first sole 200 and the edge of the second base portion 350 of the second sole 300 may be separated from each other so that lateral surfaces of the plurality of first protrusion portions 210. Lateral surfaces of the plurality of second protrusion portions 310 are exposed to the outside.

**[0061]** When the first sole 200 and the second sole 300 are formed as described above, it is possible not only to greatly decrease an overall weight of the footwear 101 but also to prevent water from being collected between the first sole 200 and the second sole 300. That is, the first sole 200 and the second sole 300, which are structured as described above, may be more usefully applied to footwear such as aqua shoes that are frequently submerged in water.

**[0062]** With the above-mentioned configuration, according to the first embodiment of the present disclosure, the footwear 101 may be lightweight and have improved impact absorbability, repulsive elasticity, and durability.

**[0063]** In addition, according to the first embodiment

of the present disclosure, the footwear 101 may effectively prevent the wearer's ankle from being sprained and suppress adduction.

**[0064]** In addition, according to the first embodiment of the present disclosure, the footwear 101 may stably withstand impact corresponding to several times the wearer's body weight, motion in one direction, and a lateral force generated by the rapid direction switching operation.

**[0065]** In addition, according to the first embodiment of the present disclosure, the two types of injection-molded products, i.e., the first sole 200 and the second sole 300 may be manufactured by a single mold. A lower structure of the footwear 101 may be completely manufactured only by two molds, which makes it possible to greatly improve productivity.

**[0066]** Hereinafter, a modified example of the first embodiment of the present disclosure will be described with reference to FIG. 6.

**[0067]** As illustrated in FIG. 6, in footwear 101a according to the modified example, the plurality of first protrusion portions 210 of the first sole 200 and the plurality of second protrusion portions 310 of the second sole 300 may each have a hollow hemispherical shape. In this case, the plurality of first protrusion portions 210 may each have a hollow hemispherical shape, a portion of the hollow hemispherical shape that faces the ground surface may be opened, and an inner surface of the hollow hemispherical shape may be exposed to the ground surface.

**[0068]** Further, the configuration in which the plurality of first protrusion portions 210, which protrudes in the direction opposite to the ground surface of the first base portion 250, means that the edge of the first protrusion portion 210 is connected to an upper side of the first base portion 250, and the first protrusion portion 210 protrudes upward, but does not mean that a bottom surface of the first protrusion portion 210 is blocked by the first base portion 250.

**[0069]** With the above-mentioned configuration, the footwear 101a according to the modified example may reduce the weight, improve the impact absorbability, repulsive elasticity, and durability, effectively prevent the wearer's ankle from being sprained, suppress adduction, and stably withstand impact corresponding to several times the wearer's body weight, the motion in one direction, and the lateral force generated by the rapid direction switching operation.

**[0070]** In particular, the plurality of first protrusion portions 210 and the plurality of second protrusion portions 310 may each independently perform the buffer function. The sides of the plurality of first protrusion portions 210, which face the ground surface, are opened such that the interiors of the plurality of first protrusion portions 210 are exposed to the ground surface. Therefore, it is possible to minimize a degree to which the ankle is bent even though the wearer of the footwear steps on a stone while walking or running on an irregular ground surface.

**[0071]** Hereinafter, a second embodiment of the

present disclosure will be described with reference to FIGS. 7 to 12.

**[0072]** As illustrated in FIGS. 7 to 12, footwear 102 according to the second embodiment of the present disclosure includes a first sole 400 and a second sole 500.

**[0073]** The first sole 400 may include a first base portion 450, a plurality of first protrusion portions 410, and first elastic reinforcement portions 480. In this case, the first base portion 450, the plurality of first protrusion portions 410, and the first elastic reinforcement portion 480 may be integrated.

**[0074]** The second sole 500 may include a second base portion 550, a plurality of second protrusion portions 510, and second elastic reinforcement portions 580. In this case, the second base portion 550, the plurality of second protrusion portions 510, and the elastic reinforcement portion 580 may be integrated.

**[0075]** In addition, like the first embodiment, even in the case of the footwear 102 according to the second embodiment, the first sole 400 and the second sole 500 may be different in hardness from each other. Further, selectively depending on hardness, the plurality of first protrusion portions 410 of the first sole 400 may be formed at an edge, or the plurality of second protrusion portions 510 of the second sole 500 may be formed at the edge.

**[0076]** The first base portion 450 may be configured to come into contact with the ground surface. Further, a tread may be formed on one surface of the first base portion 450, which comes into contact with the ground surface, to improve a contact force between the first base portion 450 and the ground surface.

**[0077]** The plurality of first protrusion portions 410 may protrude from the first base portion 450 in a direction opposite to the ground surface, i.e., protrude from the other surface opposite to one surface that comes into contact with the ground surface.

**[0078]** In an example in which the first sole 400 has relatively higher hardness than the second sole 500, the plurality of first protrusion portions 410 may be formed along the edge of the first base portion 450.

**[0079]** In addition, in the second embodiment, the first base portion 450 may have a plurality of first connection portions 455. The plurality of first connection portions 455 may be formed on the first base portion 450 to connect all or some of the plurality of first protrusion portions 410. Further, the plurality of first connection portions 455 may each have a smaller height than each of the plurality of first protrusion portions 410. The height of each of the plurality of first connection portions 455 may decrease as the distance from each of the plurality of first protrusion portions 410 increases. In addition, the plurality of first connection portions 455 may connect the plurality of first protrusion portions 410 in a longitudinal direction or a width direction of the first base portion 450. In this case, where the first sole 400 has a higher hardness than the second sole 500, the plurality of first connection portions 455 may connect the plurality of first protrusion portions

410 in the longitudinal direction of the first base portion 450. Further, in a case that the first sole 400 has lower hardness than the second sole 500, the contrary case to the above-mentioned case may be applied.

**[0080]** The plurality of first connection portions 455, which is formed as described above, reinforces strength of the plurality of first protrusion portions 410 and restricts the motion of the plurality of first protrusion portions 410. That is, the plurality of first connection portions 455 adjusts a direction in and a degree to which the plurality of first protrusion portions 410 is spread when the plurality of first protrusion portions 410 is buckled by receiving pressure.

**[0081]** The second base portion 550 may be bonded to ends of the plurality of first protrusion portions 510 of the first sole 500. That is, one surface of the second base portion 550 is bonded to the ends of the plurality of first protrusion portions 510, and the other surface of the second base portion 550 faces the bottom of the foot of the wearer.

**[0082]** The plurality of second protrusion portions 510 may protrude in a direction from the second base portion 550 to the first base portion 450. Further, ends of the plurality of second protrusion portions 510 may be bonded to the first base portion 450. That is, the plurality of first protrusion portions 410 and the plurality of second protrusion portions 510 may be disposed in a staggered manner.

**[0083]** In addition, in an example in which the second sole 500 has relatively lower hardness than the first sole 400, the plurality of second protrusion portions 510 of the second sole 500 may be disposed in the spaces between the plurality of first protrusion portions 410 of the first sole 400.

**[0084]** However, to the contrary, when the second sole 500 has relatively higher hardness than the first sole 400, the plurality of second protrusion portions 510 may be formed along the edge of the second base portion 550, and the plurality of first protrusion portions 410 may also be disposed in the spaces between the plurality of second protrusion portions 510.

**[0085]** In addition, in the second embodiment, the second base portion 550 may have a plurality of second connection portions 555. The plurality of second connection portions 555 may be formed on the second base portion 550 to connect all or some of the plurality of second protrusion portions 510. Further, the plurality of second connection portions 555 may each have a smaller height than each of the plurality of second protrusion portions 510. The height of each of the plurality of second connection portions 555 may decrease as the distance from each of the plurality of second protrusion portions 510 increases. In addition, the plurality of second connection portions 555 may connect the plurality of second protrusion portions 510 in a width direction or a longitudinal direction of the second base portion 550. In this case, where the second sole 500 has lower hardness than the first sole 400, the plurality of second connection portions

555 may connect the plurality of second protrusion portions 510 in the width direction of the second base portion 550. Further, in a case that the second sole 500 has higher hardness than the first sole 400, the contrary case to the above-mentioned case may be applied.

**[0086]** The plurality of second connection portions 555, which is formed as described above, reinforces strength of the plurality of second protrusion portions 510 and restricts the motion of the plurality of second protrusion portions 510. That is, the plurality of second connection portions 555 adjusts a direction in and a degree to which the plurality of second protrusion portions 510 is spread when the plurality of second protrusion portions 510 is buckled by receiving pressure.

**[0087]** In addition, as described above, the plurality of first connection portions 455 and the plurality of second connection portions 555 may be formed in a direction in which the plurality of first connection portions 455 and the plurality of second connection portions 555 intersect one another.

**[0088]** The first elastic reinforcement portion 480 protrudes in a direction from the first base portion 450 to the second base portion 550, and the second elastic reinforcement portion 580 protrudes in a direction from the second base portion 550 to the first base portion 450. An end of the second elastic reinforcement portion 580 and an end of the first elastic reinforcement portion 480 may be bonded while facing each other.

**[0089]** That is, like the first protrusion portion 410 and the second protrusion portion 510, the first elastic reinforcement portion 480 and the second elastic reinforcement portion 580 are not respectively bonded to the second base portion 550 and the first base portion 450, and the first elastic reinforcement portion 480 and the second elastic reinforcement portion 580 are bonded to each other. Further, one of or both the first elastic reinforcement portion 480 and the second elastic reinforcement portion 580 may each have a hemispherical shape.

**[0090]** Therefore, the first elastic reinforcement portion 480 and the second elastic reinforcement portion 580 may face each other and perform impact absorption and restoration, such that the first elastic reinforcement portion 480 and the second elastic reinforcement portion 580 may have relatively higher repulsive elasticity than the first protrusion portion 410 and the second protrusion portion 510.

**[0091]** In addition, the first elastic reinforcement portions 480 and the second elastic reinforcement portions 480 may be disposed between the plurality of first protrusion portions 410 and the plurality of second protrusion portions 510. In particular, the first elastic reinforcement portion 480 and the second elastic reinforcement portion 580 may be formed at a portion where a load and impact are concentrated on the bottom of the foot of the wearer. For example, the first elastic reinforcement portion 480 and the second elastic reinforcement portion 580 may be formed at a portion corresponding to the heel or the balls of the foot adjacent to the big toe.

**[0092]** However, because the end of the first elastic reinforcement portion 480 and the end of the second elastic reinforcement portion 580 are bonded to each other, bonding strength between the end of the first elastic reinforcement portion 480 and the end of the second elastic reinforcement portion 580 may be somewhat lower than bonding strength between the first protrusion portion 410 and the second base portion 550 and bonding strength between the second protrusion portion 510 and the first base portion 450 when the same bonding method is applied.

**[0093]** However, in case that the end of the first elastic reinforcement portion 480 and the end of the second elastic reinforcement portion 580 are bonded to each other by using the above-mentioned high-frequency bonding method, sufficient bonding strength may be ensured, and the footwear may withstand impact corresponding to several times the wearer's body weight, the motion in one direction, and the lateral force generated by the rapid direction switching operation.

**[0094]** However, the second embodiment is not necessarily limited thereto. The end of the first elastic reinforcement portion 480 and the each of the second elastic reinforcement portion 580 may be bonded to each other by various methods using a bonding agent or the like.

**[0095]** With the above-mentioned configuration, according to the second embodiment, the footwear 102 may also be lightweight and have improved impact absorability, repulsive elasticity, and durability.

**[0096]** In addition, according to the second embodiment, the footwear 102 may effectively prevent the wearer's ankle from being sprained and suppress adduction.

**[0097]** In addition, according to the second embodiment of the present disclosure, the two types of injection-molded products, i.e., the first sole 400 and the second sole 500 may be manufactured by a single mold, and a lower structure of the footwear 102 may be completely manufactured only by two molds, which makes it possible to greatly improve productivity.

**[0098]** In particular, in an example of the second embodiment in which the first sole 400 has relatively higher hardness than the second sole 500, the plurality of first protrusion portions 410 formed at the edge prevents the ankle from being bent when the wearer walks or runs. Further, the plurality of second protrusion portions 510 disperses a load to the entire bottom of the foot, absorbs impact, and provides repulsive elasticity. The first elastic reinforcement portion 480 and the second elastic reinforcement portion 580 reinforce elasticity of the portion to which relatively high load and impact are applied.

**[0099]** Therefore, when the person walks or takes an exercise over a long period of time in a state in which the person has adduction, the person easily feels fatigued, and the above-mentioned situation is a main cause of injuries to the ankle or knee. In contrast, the second embodiment may suppress adduction.

**[0100]** In addition, according to the second embodiment, the footwear 102 may stably withstand impact cor-



responding to several times the wearer's body weight, the motion in one direction, and the lateral force generated by the rapid direction switching operation.

**[0101]** Meanwhile, although not illustrated separately, the second embodiment may be modified and carried out, like the modified example of the first embodiment. That is, the first protrusion portion 410 and the second protrusion portion 510 may be modified and carried out in a hollow hemispherical shape.

**[0102]** While the embodiments of the present disclosure have been described with reference to the accompanying drawings, those skilled in the art will understand that the present disclosure may be carried out in any other specific form without changing the technical spirit or an essential feature thereof.

**[0103]** Accordingly, it should be understood that the aforementioned embodiments are described for illustration in all aspects and are not limited, and the scope of the present disclosure shall be represented by the claims to be described below, and it should be construed that all of the changes or modified forms induced from the meaning and the scope of the claims, and an equivalent concept thereto are included in the scope of the present disclosure.

#### **[Industrial Applicability]**

**[0104]** The footwear according to embodiments of the present disclosure may be used not only to reduce the weight and but also to improve the impact absorbability, the repulsive elasticity, and the durability.

#### **Claims**

##### **1. Footwear comprising:**

a first sole having a first base portion configured to come into contact with a ground surface, and a plurality of first protrusion portions protruding from the base portion in a direction opposite to the ground surface; and

a second sole having a second base portion bonded to ends of the plurality of first protrusion portions, and a plurality of second protrusion portions protruding from the second base portion in a direction of the first base portion and having ends bonded to the first base portion.

**2.** The footwear of claim 1, wherein the plurality of first protrusion portions and the plurality of second protrusion portions each have a shape having a horizontal cross-sectional area that increases in a direction in which the plurality of first protrusion portions and the plurality of second protrusion portions each protrude.

**3.** The footwear of claim 1, wherein the plurality of first

protrusion portions and the plurality of second protrusion portions each include a hemispherical shape.

**4.** The footwear of claim 3, wherein the plurality of first protrusion portions and the plurality of second protrusion portions each have a hollow hemispherical shape.

**5.** The footwear of claim 4, wherein the plurality of first protrusion portions has a hollow hemispherical shape, a portion of the hollow hemispherical shape, which faces the ground surface, is opened, and an inner surface of the hollow hemispherical shape is exposed to the ground surface.

**6.** The footwear of claim 1, wherein the first sole and the second sole are different in hardness from each other.

**7.** The footwear of claim 6, wherein the plurality of first protrusion portions or the plurality of second protrusion portions, which has relatively high hardness among the plurality of first protrusion portions and the plurality of second protrusion portions, is formed along an edge of the first base portion or the second base portion, and

wherein the plurality of first protrusion portions or the plurality of second protrusion portions, which has relatively low hardness among the plurality of first protrusion portions and the plurality of second protrusion portions, is disposed in spaces between the plurality of first protrusion portions or the plurality of second protrusion portions having relatively high hardness.

**8.** The footwear of claim 7, wherein the plurality of first protrusion portions or the plurality of second protrusion portions, which has relatively low hardness among the plurality of first protrusion portions and the plurality of second protrusion portions, has relatively higher elasticity than the plurality of first protrusion portions or the plurality of second protrusion portions having relatively high hardness.

**9.** The footwear of claim 7, wherein the first base portion has a plurality of first connection portions configured to connect all or some of the plurality of first protrusion portions, and wherein the second base portion has a plurality of second connection portions configured to connect all or some of the plurality of second protrusion portions.

**10.** The footwear of claim 9, wherein the plurality of first connection portions each has a smaller height than each of the plurality of first protrusion portions,

wherein a height of each of the plurality of first connection portions decreases as a distance

from each of the plurality of first protrusion portions increases,  
 wherein the plurality of second connection portions each has a smaller height than each of the plurality of second protrusion portions, and  
 wherein a height of each of the plurality of second connection portions decreases as a distance from each of the plurality of second protrusion portions increases.

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11. The footwear of claim 9, wherein the plurality of first connection portions connects the plurality of first protrusion portions in a longitudinal direction or a width direction of the first base portion,

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wherein the plurality of second connection portions connects the plurality of second protrusion portions in a width direction or a longitudinal direction of the second base portion, and  
 wherein the plurality of first connection portions and the plurality of second connection portions are formed in a direction in which the plurality of first connection portions and the plurality of second connection portions intersect one another.

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12. The footwear of claim 7, wherein the first sole further comprises a first elastic reinforcement portion protruding from the first base portion in a direction of the second base portion, and  
 wherein the second sole further comprises a second elastic reinforcement portion protruding from the second base portion in a direction of the first base portion and having an end facing and bonded to an end of the first elastic reinforcement portion.

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13. The footwear of claim 12, wherein the first elastic reinforcement portion and the second elastic reinforcement portion are disposed between the plurality of first protrusion portions and the plurality of second protrusion portions.

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14. The footwear of claim 12, wherein one of or both of the first elastic reinforcement portion and the second elastic reinforcement portion each have a hemispherical shape.

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Fig. 1

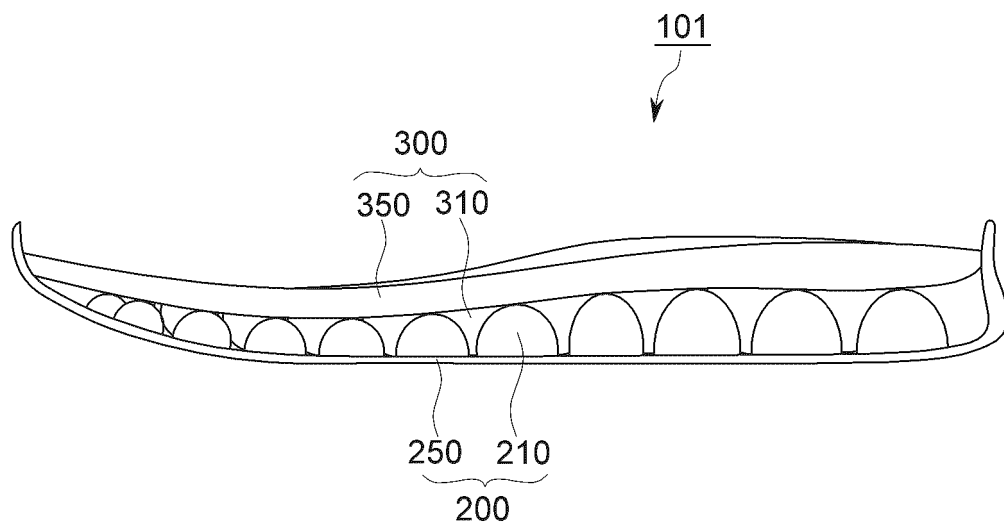


Fig. 2

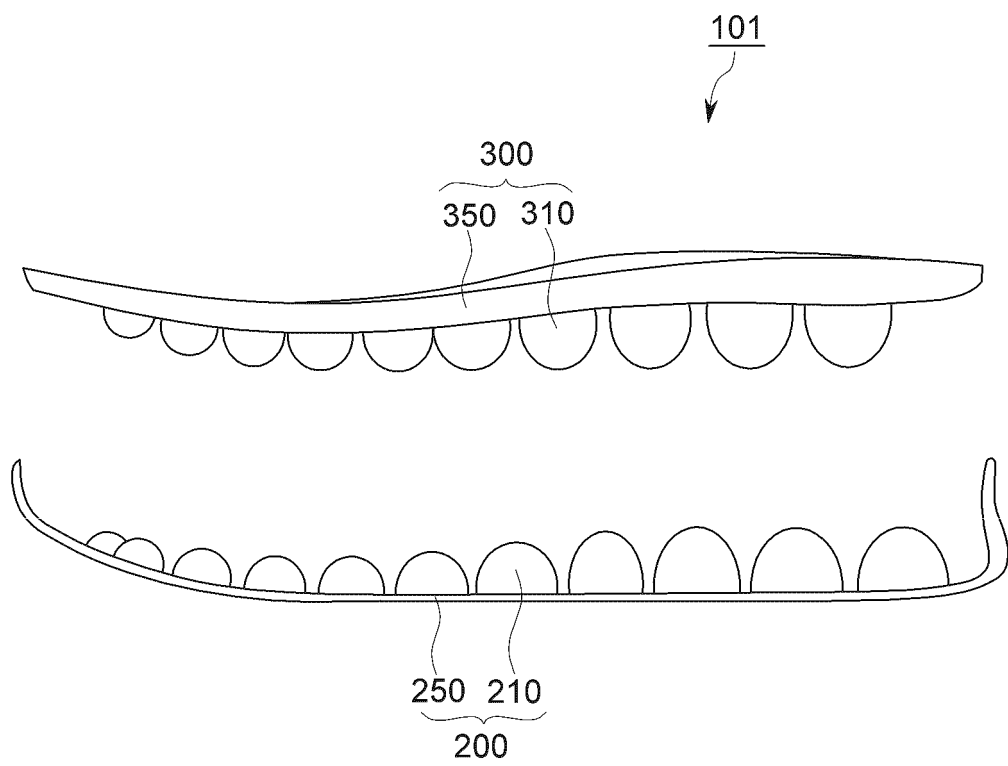


Fig. 3

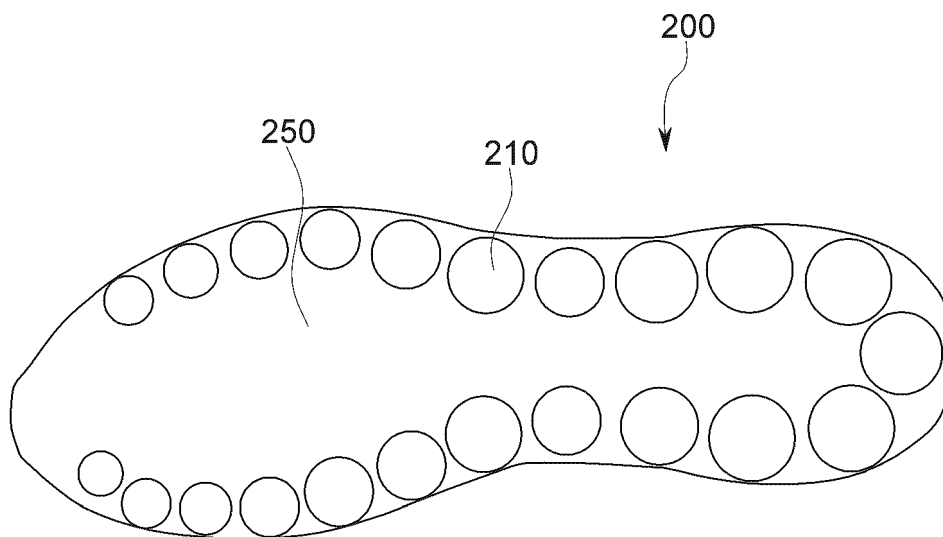


Fig. 4

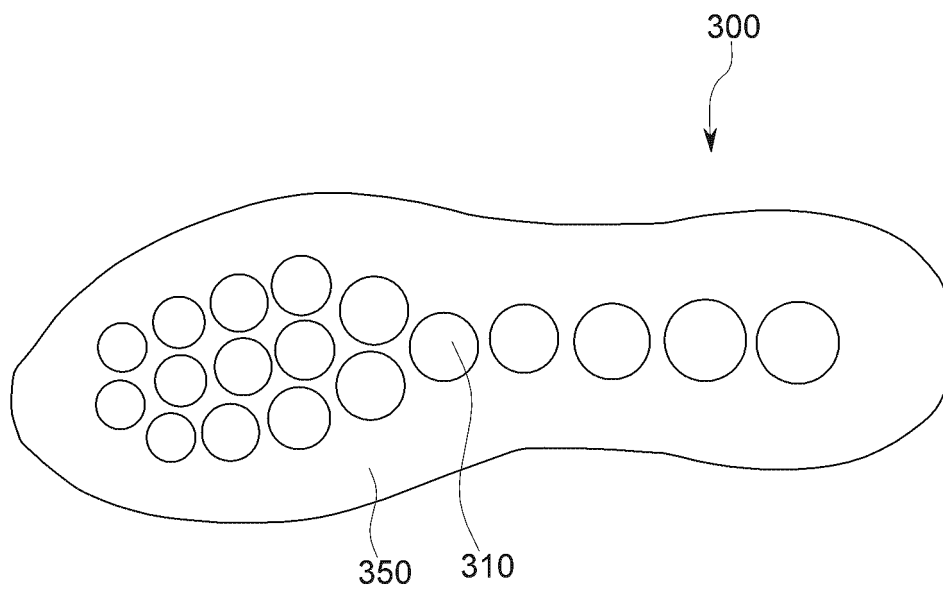


Fig. 5

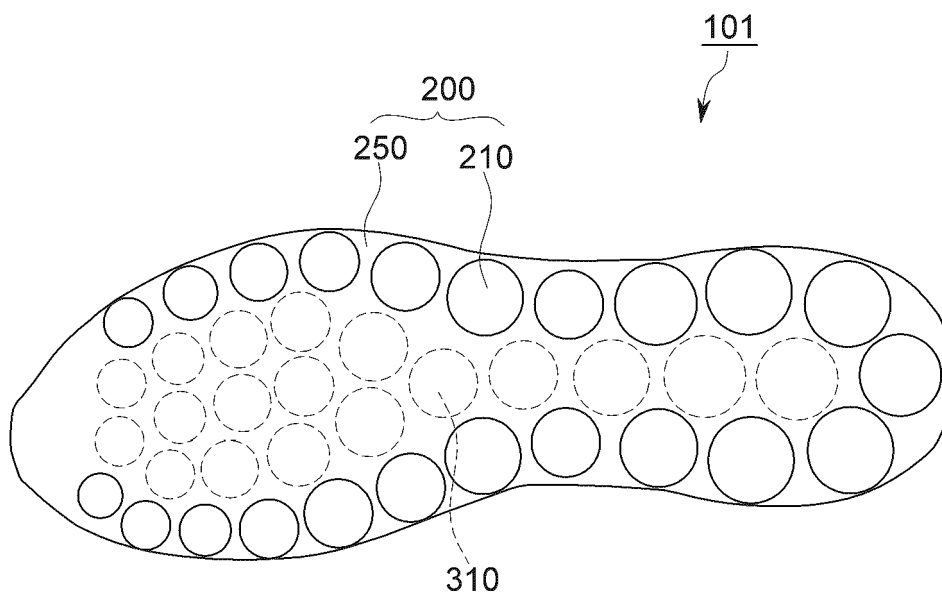


Fig. 6

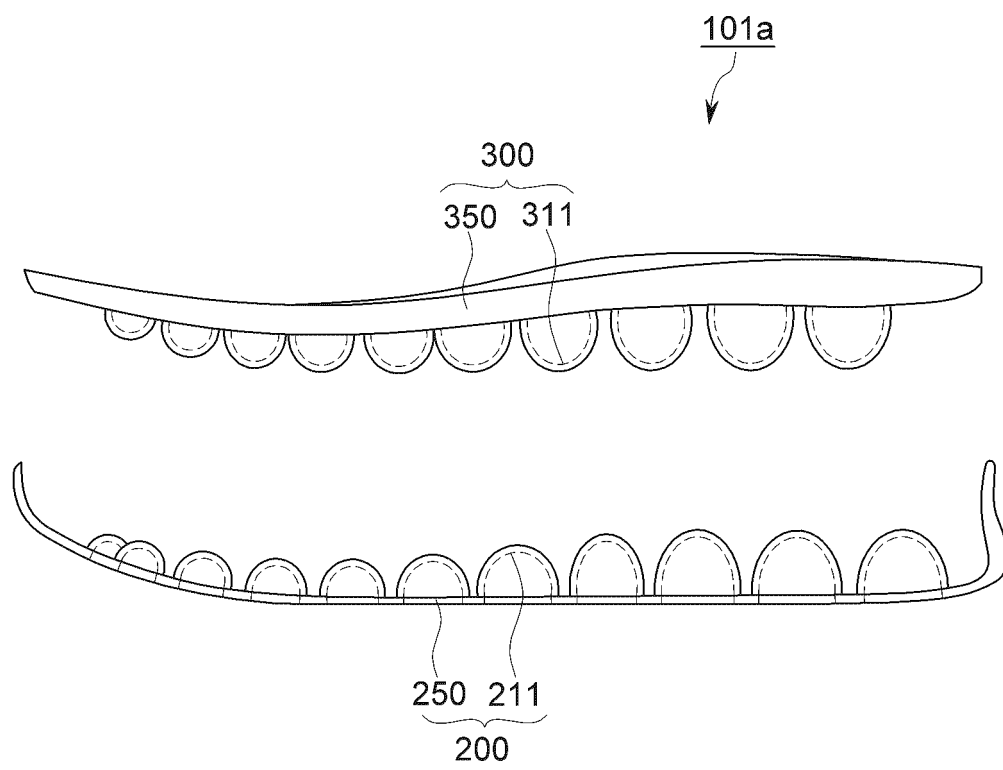




Fig. 7

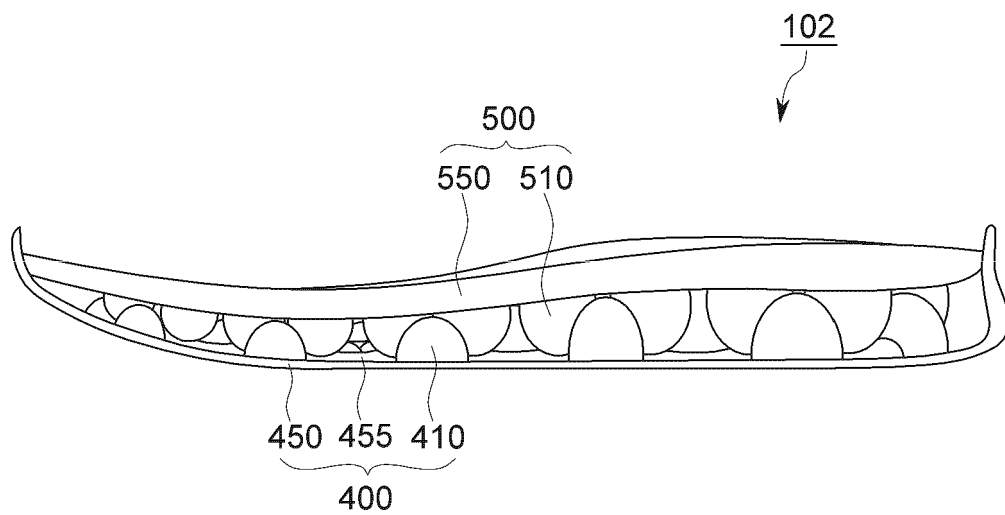


Fig. 8

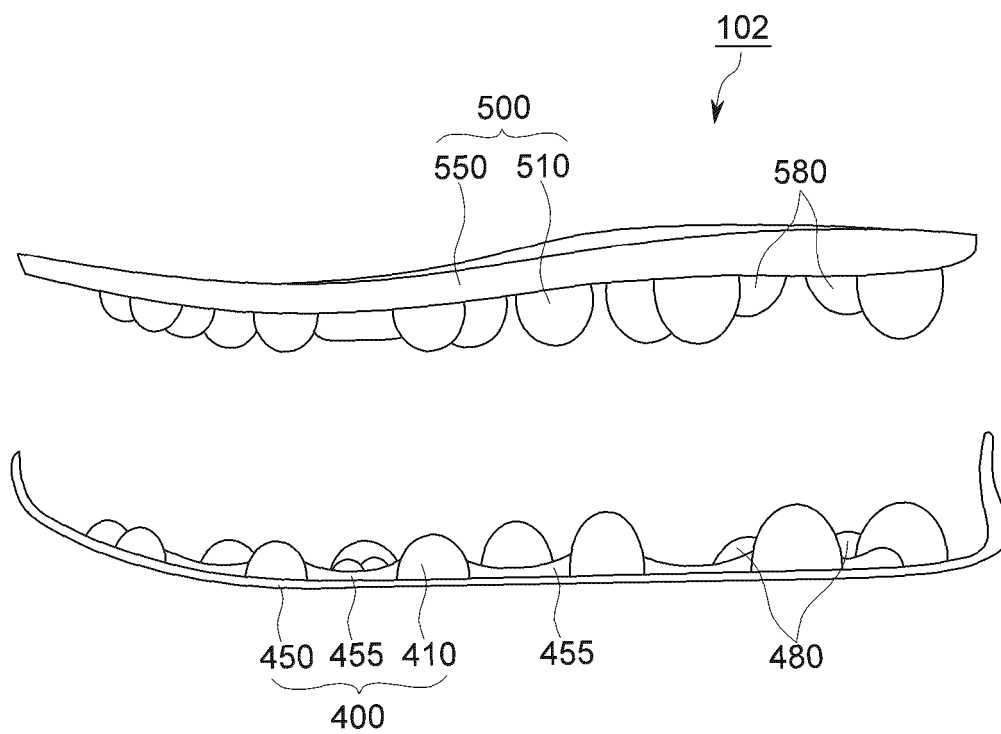


Fig. 9

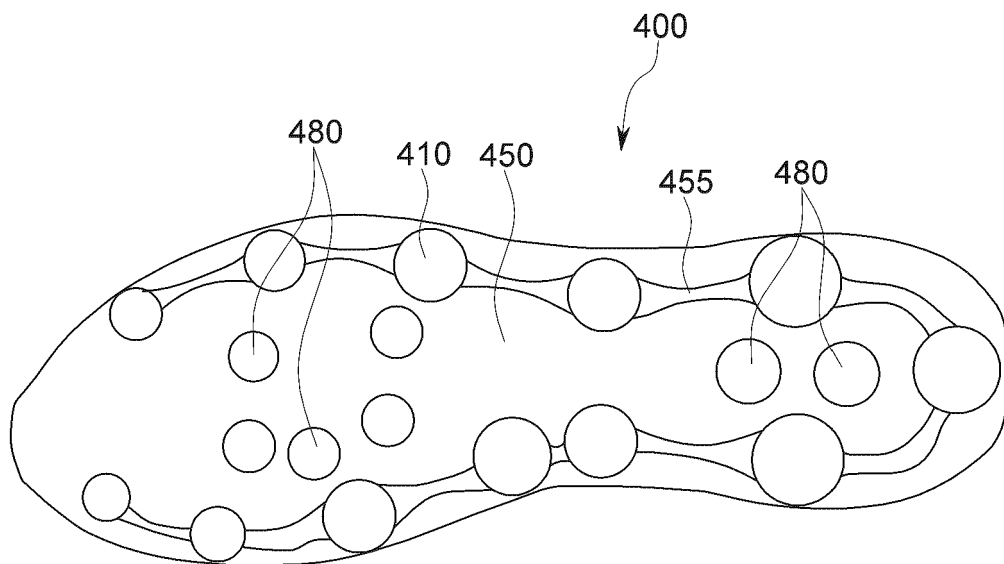


Fig. 10

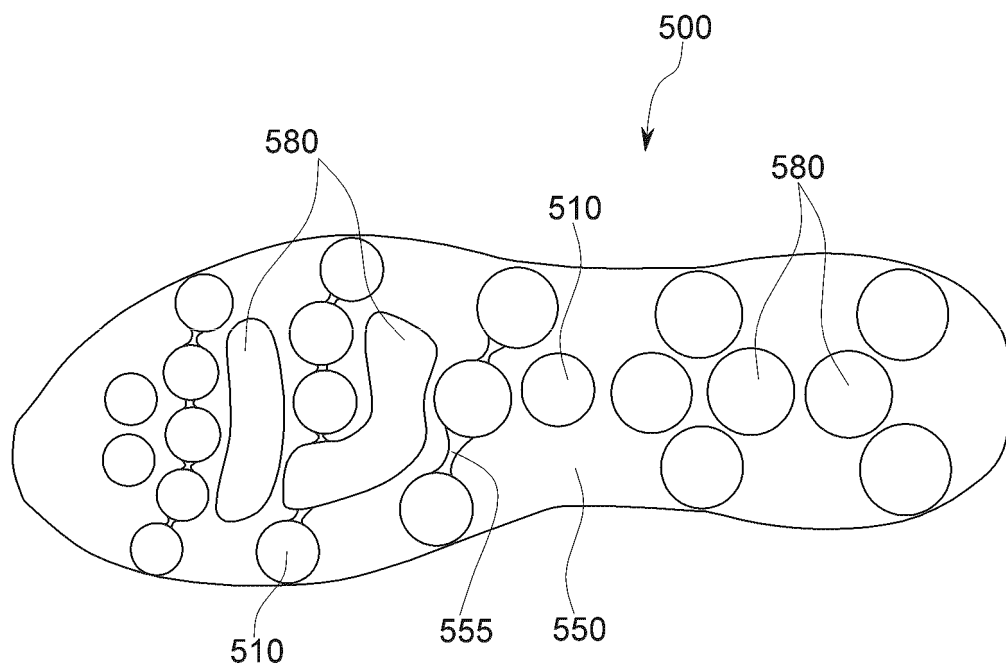


Fig. 11

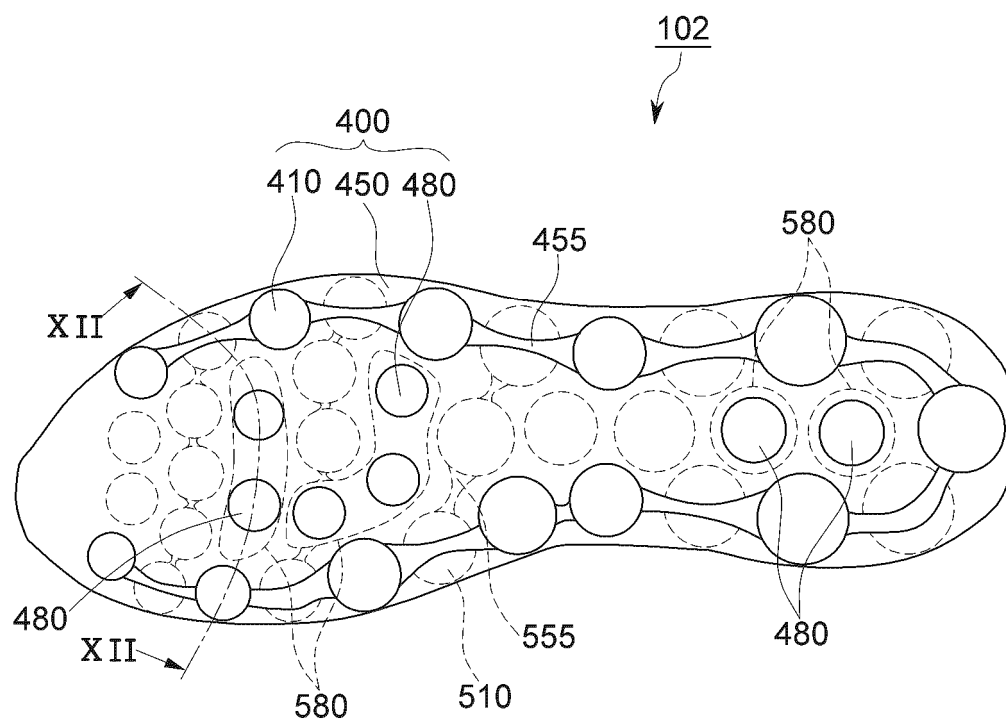
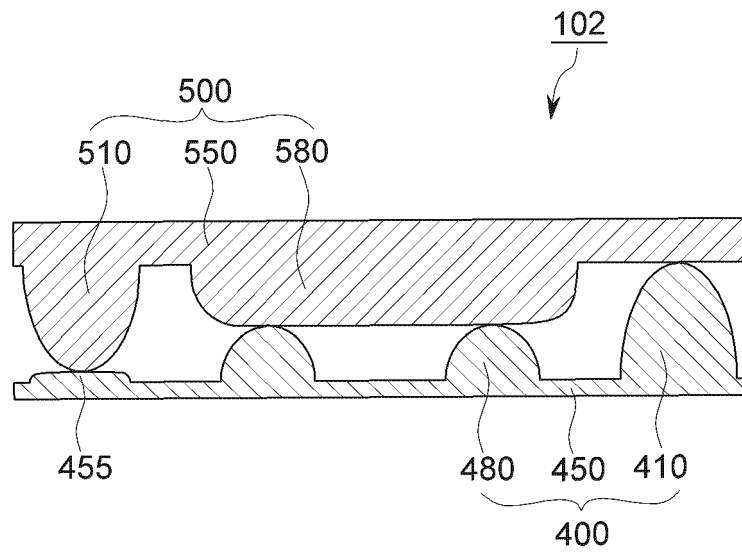


Fig. 12



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2020/016810

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> <b>A43B 13/14(2006.01)i; A43B 13/18(2006.01)i; A43B 17/02(2006.01)i; A43B 7/32(2006.01)i</b>  According to International Patent Classification (IPC) or to both national classification and IPC																					
<b>B. FIELDS SEARCHED</b>  Minimum documentation searched (classification system followed by classification symbols) A43B 13/14(2006.01); A43B 13/12(2006.01); A43B 13/18(2006.01); A43B 13/20(2006.01); A43B 13/40(2006.01); A43B 21/26(2006.01); A43B 7/00(2006.01); A43B 7/32(2006.01)  Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Korean utility models and applications for utility models: IPC as above Japanese utility models and applications for utility models: IPC as above  Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) eKOMPASS (KIPO internal) & keywords: 신발(shoes), 다층 밑창(multilayer outsole), 돌출부(protrusion), 접합(junction), 경도(hardness)																					
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <table border="1"> <thead> <tr> <th>Category*</th> <th>Citation of document, with indication, where appropriate, of the relevant passages</th> <th>Relevant to claim No.</th> </tr> </thead> <tbody> <tr> <td>Y</td> <td>KR 10-2018-0127844 A (SUNG, Ho Dong) 30 November 2018 (2018-11-30) See paragraphs [0030] and [0041]; claim 1; and figure 1.</td> <td>1-6</td> </tr> <tr> <td>A</td> <td></td> <td>7-14</td> </tr> <tr> <td>Y</td> <td>JP 2001-321201 A (ASICS CORP.) 20 November 2001 (2001-11-20) See paragraphs [0009] and [0014]; claim 1; and figure 1b.</td> <td>1-6</td> </tr> <tr> <td>Y</td> <td>KR 10-2012-0083654 A (RYN KOREA. CO., LTD.) 26 July 2012 (2012-07-26) See claim 1; and figure 1.</td> <td>1-6</td> </tr> <tr> <td>A</td> <td>KR 10-0584527 B1 (LEE, Ho Hyoung) 30 May 2006 (2006-05-30) See entire document.</td> <td>1-14</td> </tr> <tr> <td>A</td> <td>KR 10-1731627 B1 (KIM, Deok Ki) 28 April 2017 (2017-04-28) See entire document.</td> <td>1-14</td> </tr> </tbody> </table>	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.	Y	KR 10-2018-0127844 A (SUNG, Ho Dong) 30 November 2018 (2018-11-30) See paragraphs [0030] and [0041]; claim 1; and figure 1.	1-6	A		7-14	Y	JP 2001-321201 A (ASICS CORP.) 20 November 2001 (2001-11-20) See paragraphs [0009] and [0014]; claim 1; and figure 1b.	1-6	Y	KR 10-2012-0083654 A (RYN KOREA. CO., LTD.) 26 July 2012 (2012-07-26) See claim 1; and figure 1.	1-6	A	KR 10-0584527 B1 (LEE, Ho Hyoung) 30 May 2006 (2006-05-30) See entire document.	1-14	A	KR 10-1731627 B1 (KIM, Deok Ki) 28 April 2017 (2017-04-28) See entire document.	1-14
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<table border="0"> <tr> <td>           * Special categories of cited documents:            "A" document defining the general state of the art which is not considered to be of particular relevance            "D" document cited by the applicant in the international application            "E" earlier application or patent but published on or after the international filing date            "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)            "O" document referring to an oral disclosure, use, exhibition or other means            "P" document published prior to the international filing date but later than the priority date claimed         </td> <td>           "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention            "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone            "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art            "&amp;" document member of the same patent family         </td> </tr> </table>	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "D" document cited by the applicant in the international application "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family																			
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<table border="1"> <tr> <td>Date of the actual completion of the international search <b>17 June 2021</b></td> <td>Date of mailing of the international search report <b>17 June 2021</b></td> </tr> </table>	Date of the actual completion of the international search <b>17 June 2021</b>	Date of mailing of the international search report <b>17 June 2021</b>																			
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<table border="1"> <tr> <td>           Name and mailing address of the ISA/KR  <b>Korean Intellectual Property Office</b>  <b>Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208</b>            Facsimile No. +82-42-481-8578         </td> <td>           Authorized officer              Telephone No.         </td> </tr> </table>	Name and mailing address of the ISA/KR <b>Korean Intellectual Property Office</b> <b>Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208</b> Facsimile No. +82-42-481-8578	Authorized officer   Telephone No.																			
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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2020/016810

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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**INTERNATIONAL SEARCH REPORT**  
**Information on patent family members**

International application No.

**PCT/KR2020/016810**

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