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(54) **LIGHTWEIGHT SHOE SOLE HAVING
STRUCTURE DISPLAYING SHOCK
ABSORPTION AND REBOUND ELASTICITY**

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(57) **ABSTRACT**

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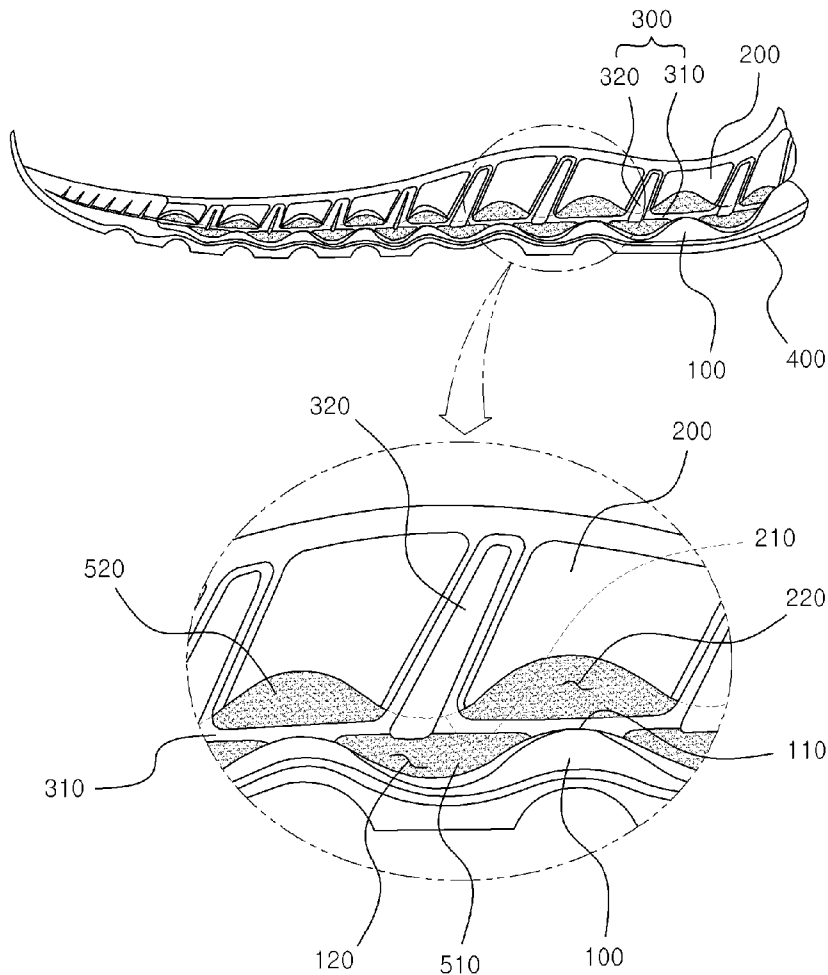
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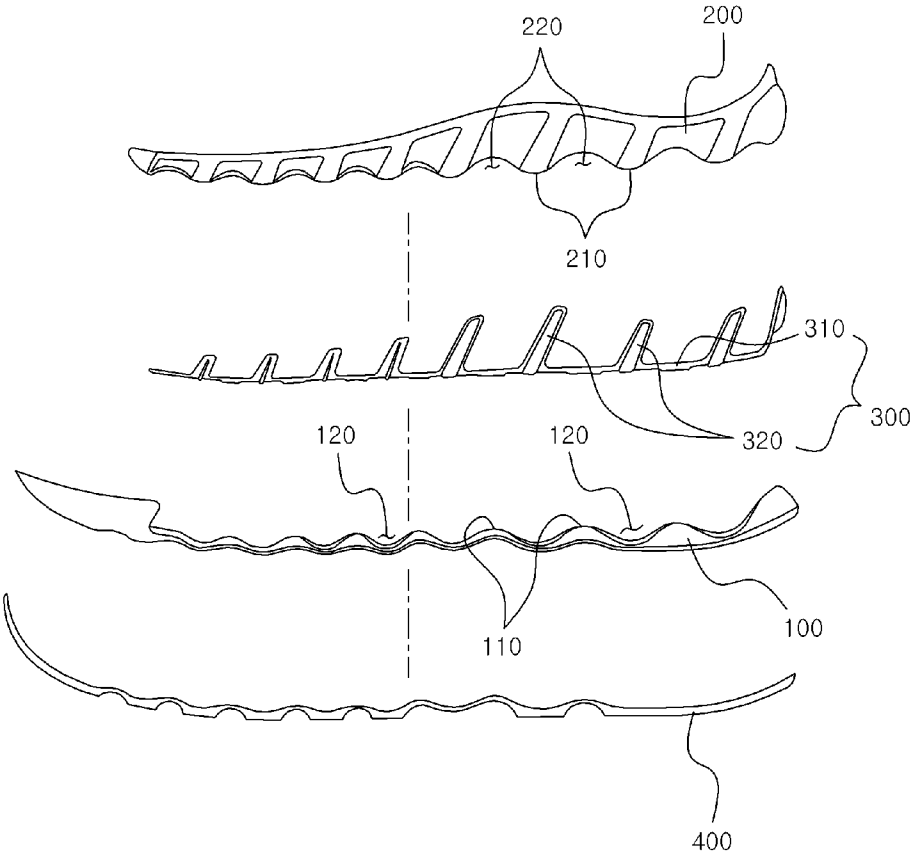
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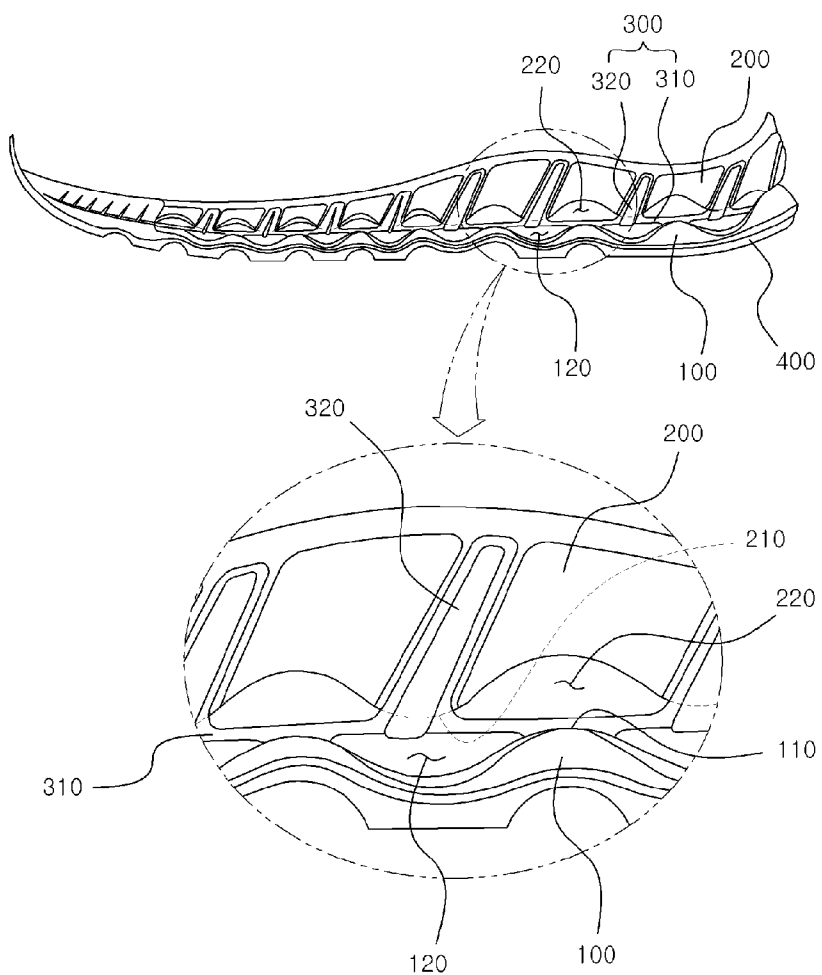
The present invention relates to a lightweight shoe sole having a structure for shock absorption and rebound resilience that is capable of improving shock absorption and rebound resilience characteristics, while providing light weight. The lightweight shoe sole includes: a reinforcing member; a first midsole having first protrusions formed integrally therewith, the first protrusions being supported on one surface of the reinforcing member; and a second midsole having second protrusions formed integrally therewith, the second protrusions being supported on the other surface of the reinforcing member, wherein the first protrusions and the second protrusions are supported by means of the reinforcing member in non-overlapping regions therebetween.



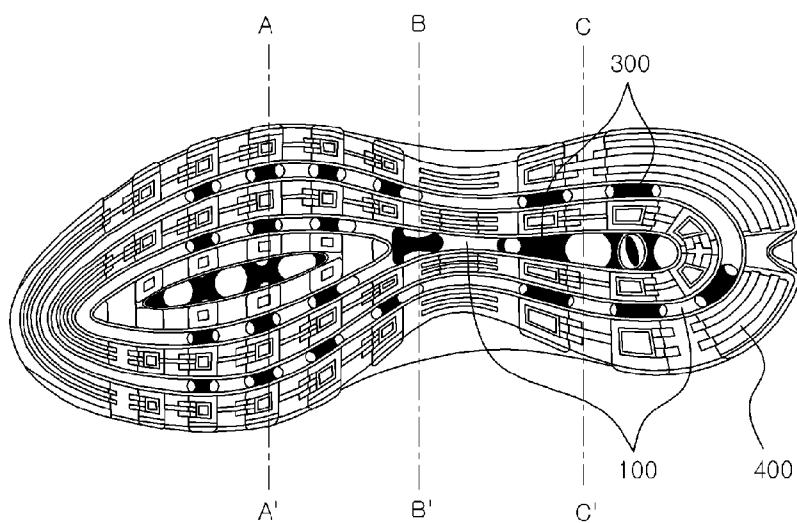
[Fig. 1]



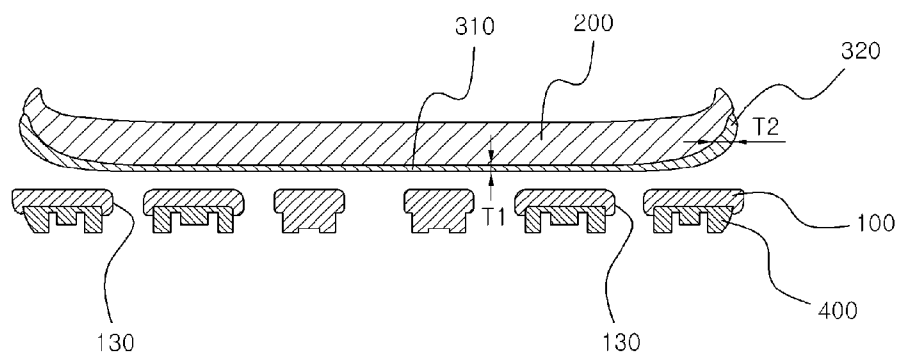
[Fig. 2]



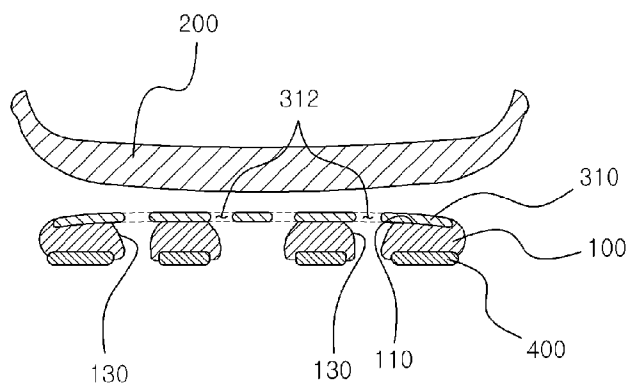
[Fig. 3]



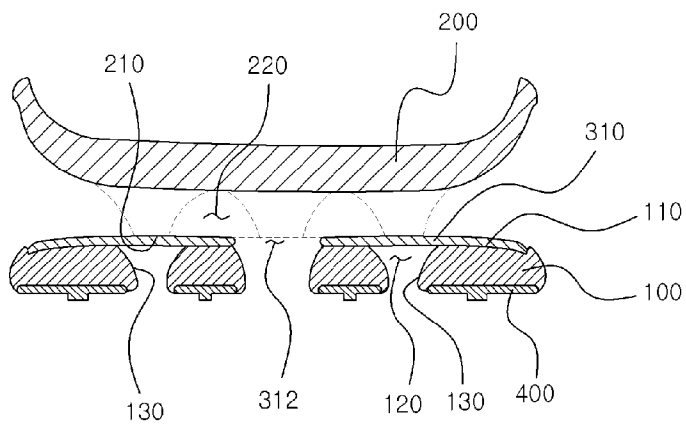
[Fig. 4]



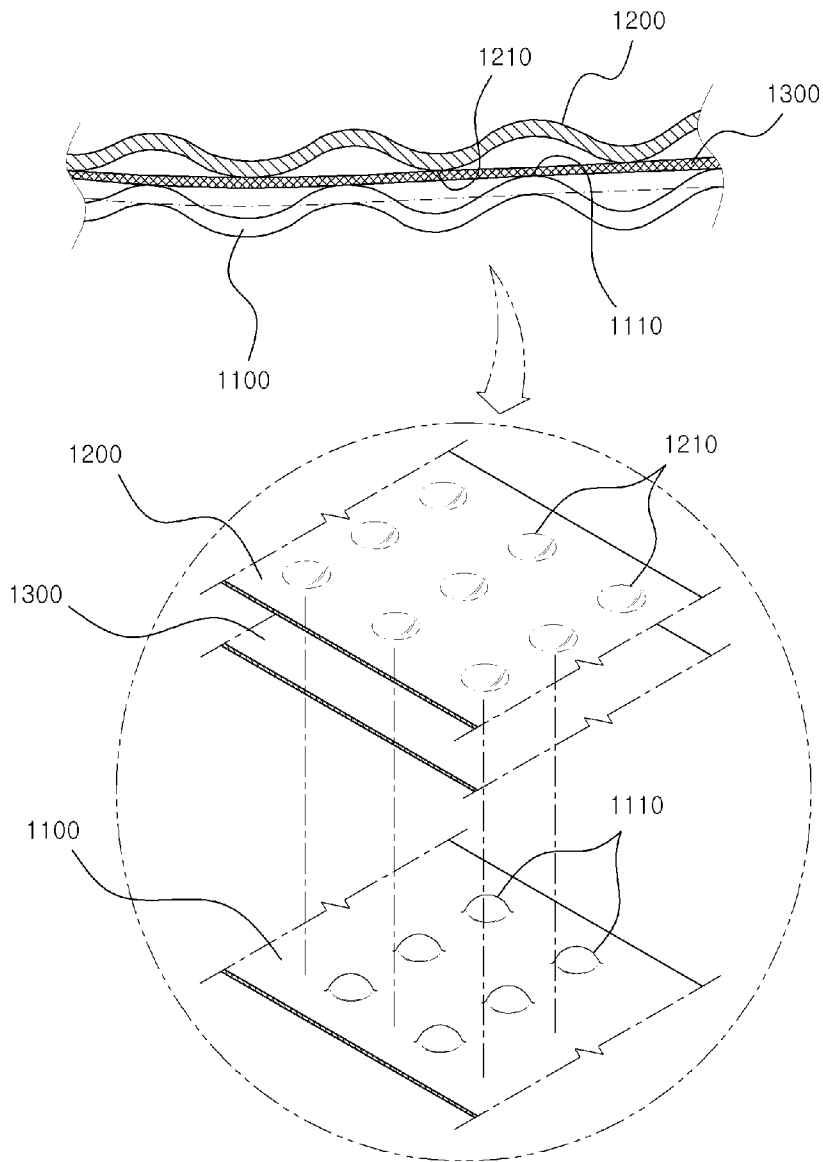
[Fig. 5]



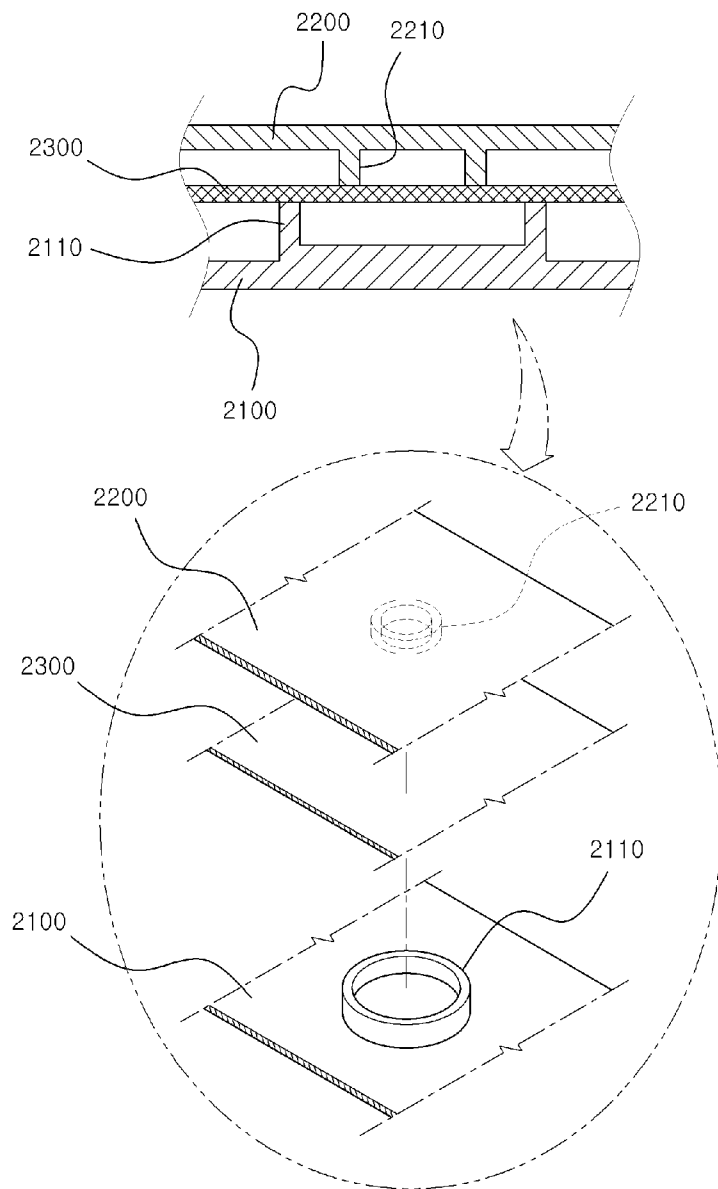
[Fig. 6]



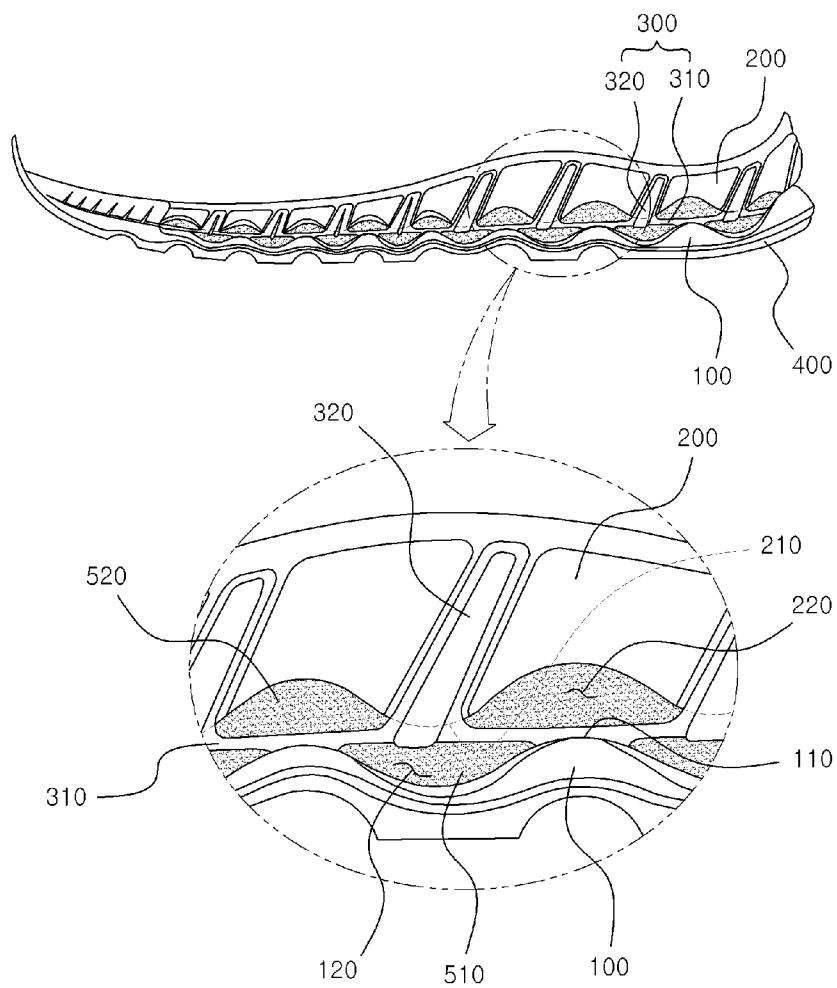
[Fig. 7]



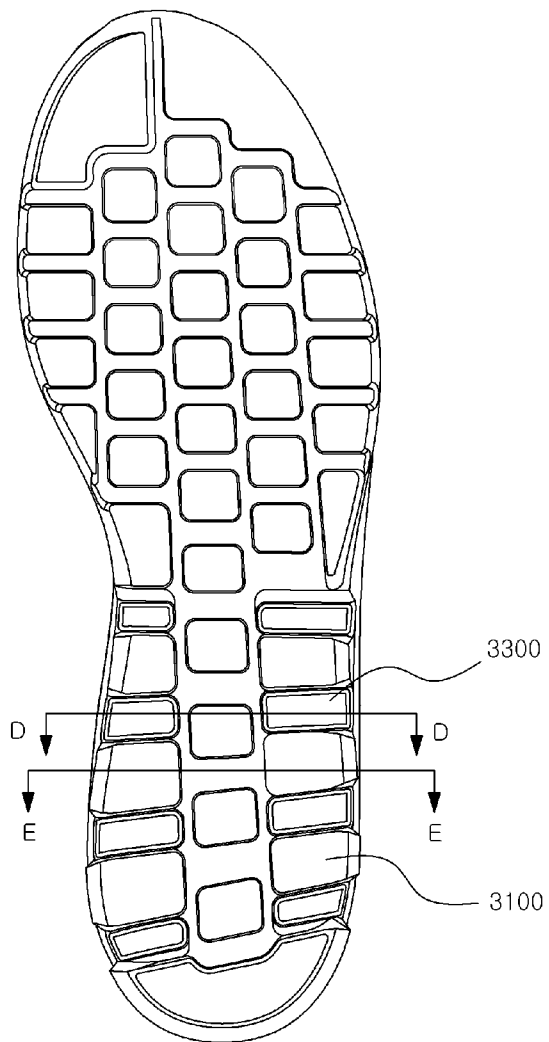
[Fig. 8]



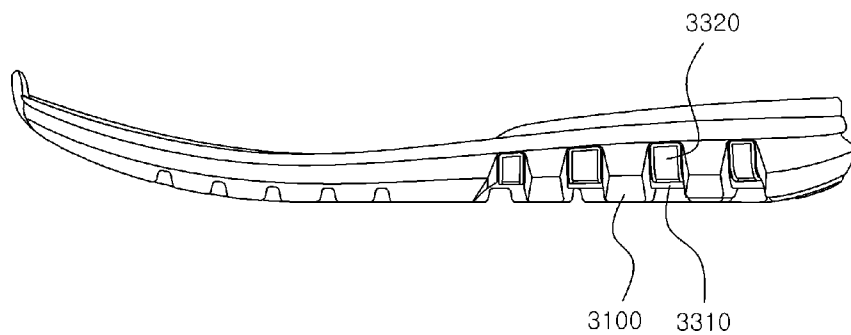
[Fig. 9]



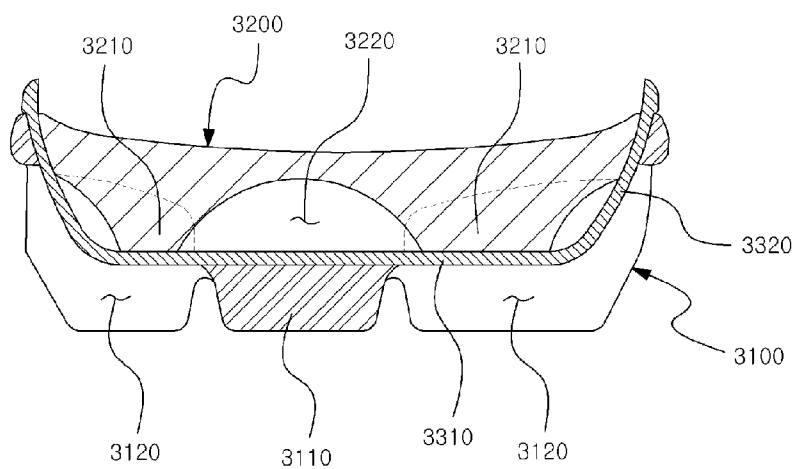
[Fig. 10]



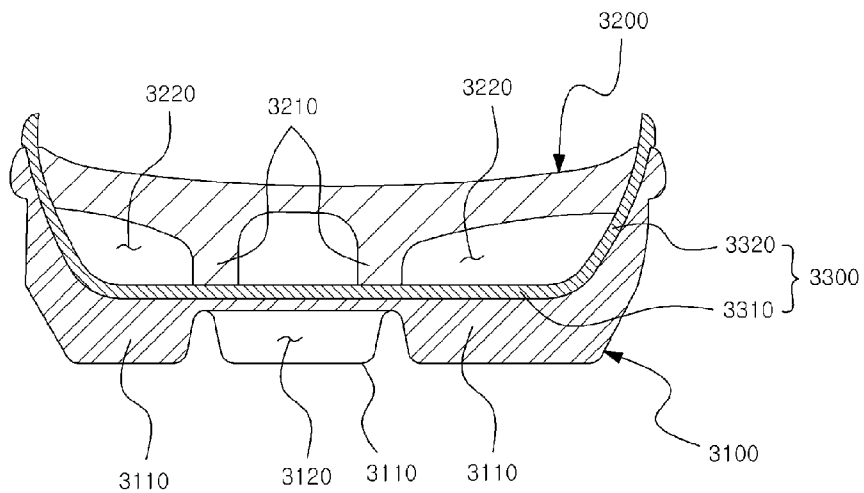
[Fig. 11]



[Fig. 12]



[Fig. 13]



**LIGHTWEIGHT SHOE SOLE HAVING
STRUCTURE DISPLAYING SHOCK
ABSORPTION AND REBOUND ELASTICITY**

TECHNICAL FIELD

[0001] The present invention relates to a shoe sole, and more particularly, to a lightweight shoe sole having a structure for shock absorption and rebound resilience that is capable of improving shock absorption and rebound resilience characteristics, while providing light weight.

BACKGROUND ART

[0002] Shoes are generally used to protect a wearer's feet, but as the cultural levels of people have been improved, the functions and utilization of the shoes have been complicated and developed.

[0003] In the past, especially, various exercises are carried out just with a pair of gym shoes, but recently, specialized functional shoes for various purposes such as walking, running, climbing, playing football, playing tennis, playing baseball, playing golf and the like have been developed in accordance with the needs of wearers.

[0004] A shoe largely includes an upper part formed to protect the top side of the foot and the joint portions and a sole part formed to protect the sole of the foot. The shocks caused during walking and running may be transmitted to the wearer's body through the sole part of the shoe, and thus, if the sole part is a little heavy, he or she may feel easily fatigued. Therefore, the sole part of the shoe should have a light structure capable of providing shock absorption characteristics.

[0005] As a result, various studies on the sole part of the shoe have been recently made to reduce the shocks applied to the human body during walking and running as well as to achieve substantially light weight, but unfortunately, such studies do not completely satisfy the needs of wearers. Therefore, there is a definite need for the development of a lightweight shoe sole having shock absorption performance.

DISCLOSURE

Technical Problem

[0006] An aspect of the present invention provides a lightweight shoe sole having a structure for shock absorption and rebound resilience that has shock absorption characteristics capable of minimizing the shocks applied to a wearer during walking and running and at the same time that has rebound resilience characteristics capable of providing energy for next operation.

[0007] An aspect of the present invention also provides a lightweight shoe sole having a structure for shock absorption and rebound resilience that has excellent wearing comfort, while improving the energy efficiency of a wearer even during long hours wearing to reduce the fatigue applied to the wearer's foot.

Technical Solution

[0008] According to an aspect of the present invention, there is provided a lightweight shoe sole having a structure for shock absorption and rebound resilience, including: a reinforcing member; a first midsole having first protrusions formed integrally therewith, the first protrusions being supported on one surface of the reinforcing member; and a second midsole having second protrusions formed integrally

therewith, the second protrusions being supported on the other surface of the reinforcing member, wherein the first protrusions and the second protrusions are supported by means of the reinforcing member in non-overlapping regions therebetween.

[0009] Preferably, the first protrusions of the first midsole are spaced apart from each other, while the second protrusions of the second midsole are spaced apart from each other, and a first shock-absorbing space is formed between the neighboring first protrusions, while a second shock-absorbing space is formed between the neighboring second protrusions.

[0010] Preferably, the shapes, sizes and spacing distances of the first protrusions and the second protrusions are freely varied in accordance with their requirements and design specifications, and accordingly, the shapes and sizes of the first shock-absorbing spaces and the second shock-absorbing spaces are changed, depending upon the shapes, sizes and spacing distances of the first protrusions and the second protrusions. For example, the first protrusions and the second protrusions are provided in a form of waves in the longitudinal directions of the first midsole and the second midsole. Further, the first protrusions and the second protrusions are provided in an integral form located continuously in the width directions of the first midsole and the second midsole or in plural forms located discontinuously in the width directions thereof.

[0011] Preferably, the first midsole and the second midsole are made of the same material to have the same resilience and hardness as each other, and in some cases, they may be made of different materials to have different resilience and hardness from each other.

[0012] Preferably, the first protrusions and the second protrusions are supported by means of the reinforcing member in non-overlapping regions therebetween. This means the supported portions of the first protrusions and the second protrusions by means of the reinforcing member are not laid on each other at the top view. In more detail, when viewing from the top, the first protrusions are supported on the second shock-absorbing spaces by means of the reinforcing member, and the second protrusions are on the first shock-absorbing spaces by means of the reinforcing member. Further, at least any ones of the first shock-absorbing spaces and the second shock-absorbing spaces are formed in such a manner as to communicate with the outside.

[0013] Preferably, the reinforcing member is made of a high resilient material having relatively higher resilience than the first midsole and the second midsole. In some cases, it may be made of a low resilient material having relatively lower resilience than the first midsole and the second midsole, and the hardness of the reinforcing member and the respective midsoles may be varied in accordance with their requirements and design specifications.

[0014] Preferably, the structure of the reinforcing member is freely changed in accordance with the requirements and design specifications thereof. For example, the reinforcing member largely includes a reinforcing plate against which the first protrusions and the second protrusions are supported and reinforcing ribs bent integrally from the side end portion of the reinforcing plate, so as to surround the side end portion of at least one of the first midsole and the second midsole.

[0015] Preferably, the reinforcing ribs serve to suppress the twisting generated during walking and running, thereby

ensuring more stable walking and running, and the reinforcing ribs have a relatively higher thickness than the reinforcing plate.

[0016] So as to ensure the mobility of the reinforcing member during walking and running in a more stable manner, preferably, the reinforcing plate has at least one or more incised portions formed thereon. On the other hand, the first midsole disposed on the underside of the reinforcing member has a plurality of exposure holes formed thereon, through which a portion of the reinforcing plate is exposed from the underside surface of the first midsole.

ADVANTAGEOUS EFFECTS

[0017] As set forth in the foregoing, there is provided the lightweight shoe sole having a structure for shock absorption and rebound resilience that is capable of improving the shock absorption and distribution performance to minimize the shocks applied to the wearer during walking and running and that is capable of enhancing rebound resilience performance to provide energy for next operation, while providing light weight.

[0018] According to the present invention, especially, the first protrusions of the first midsole and the second protrusions of the second midsole are supported by means of the reinforcing member made of a high resilient material in non-overlapping regions therebetween, so that the shocks generated during walking and running can be effectively absorbed and distributed. That is, the shocks transmitted from the first protrusions and the second protrusions are evenly distributed and absorbed by means of the reinforcing member, thereby optimizing the shock absorption and distribution performance thereof.

[0019] Further, the first protrusions and the second protrusions are supported by means of the reinforcing member made of the high resilient material, thereby optimizing the rebound resilience performance providing the energy for next operation. That is, momentum (rebound resilience) at the time of taking off during the walking and running can be improved.

[0020] Further, the lightweight shoe sole according to the present invention provides excellent wearing comfort, ensures more comfortable walking and running, and improves the energy efficiency of the wearer even during long hours wearing to reduce the fatigue applied to the wearer's foot.

[0021] Furthermore, the lightweight shoe sole according to the present invention provides the first shock-absorbing spaces and the second shock-absorbing spaces, placing the reinforcing member therebetween, thereby ensuring excellent shock absorption performance and substantially reducing the weight of the shoe sole.

[0022] Additionally, the lightweight shoe sole according to the present invention effectively absorbs and distributes side shocks generated from the sides of the shoe sole.

[0023] Lastly, the lightweight shoe sole according to the present invention has the filling materials filled into the first shock-absorbing spaces and the second shock-absorbing spaces to previously prevent foreign matters such as sand, gravels and the like from entering the first shock-absorbing spaces and the second shock-absorbing spaces, thereby completely keeping the cushion force and the shock absorption performance from being diminished.

DESCRIPTION OF DRAWINGS

[0024] The above and other aspects of the present invention will become apparent and more readily appreciated from the following detailed description of certain exemplary embodiments of the invention, taken in conjunction with the accompanying drawings of which:

[0025] FIG. 1 is a side view showing a structure of a lightweight shoe according to an exemplary embodiment of the present invention.

[0026] FIG. 2 is a side view showing the lightweight shoe sole according to an exemplary embodiment of the present invention.

[0027] FIG. 3 is a bottom view showing the lightweight shoe sole according to an exemplary embodiment of the present invention.

[0028] FIG. 4 is a sectional view taken along the line A-A of FIG. 3.

[0029] FIG. 5 is a sectional view taken along the line B-B of FIG. 3.

[0030] FIG. 6 is a sectional view taken along the line C-C of FIG. 3.

[0031] FIGS. 7 and 8 are side views showing variations of the lightweight shoe sole according to an exemplary embodiment of the present invention.

[0032] FIG. 9 is a side view showing a lightweight shoe sole according to another exemplary embodiment of the present invention.

[0033] FIG. 10 is a bottom view showing a lightweight shoe sole according to another exemplary embodiment of the present invention.

[0034] FIG. 11 is a side view showing the lightweight shoe sole of FIG. 10.

[0035] FIG. 12 is a sectional view taken along the line D-D of FIG. 10.

[0036] FIG. 13 is a sectional view taken along the line E-E of FIG. 10.

MODE FOR INVENTION

[0037] Reference will now be made in detail to exemplary embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to the like elements throughout. The exemplary embodiments are described below in order to explain the present invention by referring to the figures.

[0038] FIG. 1 is a side view showing a structure of a lightweight shoe according to an exemplary embodiment of the present invention, FIG. 2 is a side view showing the lightweight shoe sole according to an exemplary embodiment of the present invention, and FIG. 3 is a bottom view showing the lightweight shoe sole according to an exemplary embodiment of the present invention. Further, FIG. 4 is a sectional view taken along the line A-A of FIG. 3, FIG. 5 is a sectional view taken along the line B-B of FIG. 3, and FIG. 6 is a sectional view taken along the line C-C of FIG. 3. On the other hand, FIGS. 7 and 8 are side views showing variations of the lightweight shoe sole according to an exemplary embodiment of the present invention.

[0039] As shown in the drawings, a lightweight shoe sole having a structure for shock absorption and rebound resilience largely includes a reinforcing member 300, a first midsole 100, and a second midsole 200.

[0040] The reinforcing member 300 is provided between the first midsole 100 and the second midsole 200, and the first

midsole **100** and the second midsole **200** having the reinforcing member **300** located therebetween are disposed between an insole (not shown) and an outsole **400**. Hereinafter, an example, where the first midsole **100** is disposed on the underside of the reinforcing member **300** and the second midsole **200** on the top of the reinforcing member **300**, will be explained. In some cases, the positions of the first midsole **100** and the second midsole **200** may be changed to each other.

[0041] The first midsole **100** has first protrusions **110** formed integrally with the top surface thereof. For example, the first midsole **100** having the first protrusions **110** is made of rubber or synthetic resin by means of typical foaming, and in some cases, the first midsole **100** may be made of an unfoamed material or other materials.

[0042] The first protrusions **110** are spaced apart from each other by a given distance in the longitudinal direction of the first midsole **100**, and a first shock-absorbing space **120** is formed between the neighboring first protrusions **110**.

[0043] The shapes, sizes and spacing distances of the first protrusions **110** may be freely varied in accordance with their requirements and design specifications, and accordingly, the shapes and sizes of the first shock-absorbing spaces **120** may be changed, depending upon the shapes, sizes and spacing distances of the first protrusions **110**. Hereinafter, an example, where the first protrusions **110** are provided in a form of waves in the longitudinal direction of the first midsole **100**, will be explained.

[0044] Moreover, the first protrusions **110** may be provided in an integral form located continuously in the width direction of the first midsole **100** or in a plural form located discontinuously in the width direction thereof. Hereinafter, an example, where the first protrusions **110** are provided in a plural form located discontinuously in the width direction of the first midsole **100**, will be explained.

[0045] If the first protrusions **110** are provided in a plural form located discontinuously in the width direction of the first midsole **100**, light weight of the shoe sole can be achieved, and even though shocks are generated from sides, they will be effectively absorbed and distributed through a plurality of spaces formed between the first protrusions **110**. That is, since the first protrusions **110** are formed discontinuously in the width direction of the first midsole **100**, given spaces between the neighboring first protrusions **110** are provided, and as a result, even though shocks are generated from sides, the given spaces can effectively absorb and distribute the side shocks. Under the above structure, furthermore, inside air can be moved along the spaces between the first protrusions **110** upon the generation of the shocks caused in the loading direction, thereby further improving the shock absorption and distribution characteristics.

[0046] The second midsole **200** is provided on the top side of the first midsole **100** and has second protrusions **210** formed integrally with the underside surface thereof. For example, the second midsole **200** having the second protrusions **210** is made of rubber or synthetic resin by means of typical foaming, and in some cases, the second midsole **200** may be made of an unfoamed material or other materials.

[0047] The second protrusions **210** are spaced apart from each other by a given distance in the longitudinal direction of the second midsole **200**, and a second shock-absorbing space **220** is formed between the neighboring second protrusions **210**.

[0048] The shapes, sizes and spacing distances of the second protrusions **210** may be freely varied in accordance with their requirements and design specifications, and accordingly, the shapes and sizes of the second shock-absorbing spaces **220** may be changed, depending upon the shapes, sizes and spacing distances of the second protrusions **210**. Hereinafter, an example, where the second protrusions **210** are provided in a form of waves in the longitudinal direction of the second midsole **200**, will be explained.

[0049] Moreover, the second protrusions **210** may be provided in an integral form located continuously in the width direction of the second midsole **200** or in a plural form located discontinuously in the width direction thereof. Hereinafter, an example, where the second protrusions **210** are provided in a plural form located discontinuously in the width direction of the second midsole **200**, will be explained.

[0050] The first midsole **100** and the second midsole **200** are made of the same material to have the same resilience and hardness as each other, and in some cases, they may be made of different materials to have different resilience and hardness from each other.

[0051] The first protrusions **110** and the second protrusions **210** are supported by means of the reinforcing member **300** in the non-overlapping regions therebetween. This means the supported portions of the first protrusions **110** and the second protrusions **210** by means of the reinforcing member **300** are not laid on each other at the top view. In more detail, when viewing from the top, the first protrusions **110** are supported on the second shock-absorbing spaces **220** by means of the reinforcing member **300**, and the second protrusions **210** are on the first shock-absorbing spaces **120** by means of the reinforcing member **300**.

[0052] On the other hand, at least any ones of the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220** may be formed in such a manner as to communicate with the outside. Hereinafter, an example, where both of the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220** are pierced in a form of a tunnel in the width directions of the first midsole **100** and the second midsole **200** in such a manner as to communicate with the outside, will be explained. In some cases, any ones of the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220** are formed to communicate with the outside, and alternatively, they are formed to have a form of a tunnel having one end closed.

[0053] Like this, the structure, wherein the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220** are formed to communicate with the outside, can be used as a kind of open air chambers, and accordingly, unlike generally known closed air chambers, the open air chambers allow the air in the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220** to be moved along the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220** and emitted to the outside, thereby more effectively absorbing and distributing the shocks applied to the sole.

[0054] The reinforcing member **300** is made of a high resilient material having relatively higher resilience than the first midsole **100** and the second midsole **200** and is interposed between the first midsole **100** and the second midsole **200** to resiliently support the first protrusions **110** and the second protrusions **210**.

[0055] For example, the reinforcing member **300** is made of thermoplastic polyurethane (TPU) having relatively higher

resilience than the first midsole **100** and the second midsole **200**. In some cases, it may be made of a low resilient material having relatively lower resilience than the first midsole **100** and the second midsole **200**, and the hardness of the reinforcing member **300** and the respective midsoles may be varied in accordance with their requirements and design specifications.

[0056] The reinforcing member **300** is made of a typical foaming or unfoamed material and may be made of other materials in accordance with the requirements and design specifications thereof.

[0057] The structure of the reinforcing member **300** is freely changed in accordance with the requirements and design specifications thereof. For example, the reinforcing member **300** largely includes a reinforcing plate **310** against which the first protrusions **110** and the second protrusions **210** are supported and reinforcing ribs **320** bent integrally from the side end portion of the reinforcing plate **310**, while being spaced apart from the reinforcing plate **310** by a given distance, so as to surround the side end portion of at least one of the first midsole **100** and the second midsole **200**. The reinforcing ribs **320** are formed to a form of a rib from the reinforcing plate **310**. Hereinafter, an example, where the reinforcing ribs **320** are bent upwardly from the reinforcing plate **310** to surround the side end portion of the second midsole **200**, will be given.

[0058] The reinforcing ribs **320** have given sizes, and further, they are spaced apart from each other by a given distance along the side end portion of the reinforcing plate **310**. The sizes of the reinforcing ribs **320**, the number of reinforcing ribs **320**, and the spacing distances thereof are appropriately changed in accordance with their requirements and design specifications.

[0059] The reinforcing ribs **320** serve to suppress the twisting generated during the walking and running, thereby ensuring more stable walking and running. So as to improve the function of suppressing the twisting, moreover, the reinforcing ribs **320** desirably has a relatively higher thickness than the reinforcing plate **310** ($T_2 > T_1$). In some cases, the reinforcing plate **310** may be provided alone, without having any separate reinforcing ribs **320**.

[0060] So as to ensure the mobility of the reinforcing member **300** during the walking and running in a more stable manner, further, the reinforcing plate **310** has at least one or more incised portions **312** formed thereon. The incised portions **312** may be formed in the longitudinal or width direction of the reinforcing plate **310** in accordance with their requirements and design specifications, and the sections where the incised portions **312** are formed are appropriately varied in accordance with their requirements. Further, the incised portions having different sizes and shapes may be formed by special section (for example, forefoot, midfoot and heel).

[0061] Moreover, the incised portions **312** help the weight of the shoe sole light and allow the air movement between the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220**, thereby achieving the shock absorption and distribution in a more gentle manner. Furthermore, even though the shocks are generated from the sides of the sole, the incised portions **312** ensure the mobility of the reinforcing plate **310**, thereby effectively absorbing and distributing the side shocks.

[0062] On the other hand, the first midsole **100** disposed on the underside of the reinforcing member **300** has exposure holes **130** formed thereon, through which a portion of the reinforcing plate **310** is exposed from the underside surface of

the first midsole **100**. The exposure holes **130** provide a bridge structure to the first midsole **100**, thereby improving the shock absorption function, and further, the formation of the exposure holes **130** permits the shoe to be lighter.

[0063] The outsole **400** is disposed on the underside of the first midsole **100**. The outsole **400** is a portion that comes into direct contact with the ground, which is made of a material and structure capable of preventing sliding and providing stability.

[0064] Referring to FIG. 7, on the other hand, a first midsole **1100** has first protrusions **1110** spaced apart from each other by a given distance in an embossing form, and a second midsole **1200** has second protrusions **1210** spaced apart from each other by a given distance in an embossing form. In the same manner as above, the first protrusions **1110** and the second protrusions **1210** are supported by means of a reinforcing member **1300** in non-overlapping regions therebetween.

[0065] Referring to FIG. 8, furthermore, at least ones of first protrusions **2110** of a first midsole **2100** and second protrusions **2210** of a second midsole **2200** are formed to a form of a closed loop. For example, the first protrusions **2110** and the second protrusions **2210** are formed to a shape of a generally hollow cylindrical closed loop, and in this case, the second protrusions **2210** have relatively smaller diameters than the first protrusions **2110** in such a manner as to be supported by means of a reinforcing member **2300** in the regions corresponding to the internal regions of the first protrusions **2110**. In some cases, the second protrusions **2210** have relatively larger diameters (or sizes) than the first protrusions **2110** in such a manner as to be supported by means of the reinforcing member **2300** in the regions corresponding to the external regions of the first protrusions **2110**. Further, the first protrusions **2110** and the second protrusions **2210** may have other closed loop shapes in accordance with their requirements and design specifications, and alternatively, they may have the closed loop shapes corresponding to the whole shape of the shoe. Further, each of the first protrusions and the second protrusions having the closed loop shape corresponding to the whole shape of the shoe may be spaced apart from each other in such a manner as to have gradually reduced or increased sizes.

[0066] On the other hand, FIG. 9 is a side view showing a lightweight shoe sole according to another exemplary embodiment of the present invention. Further, the same components as the above-mentioned structure of the shoe sole are indicated by the same reference numerals as each other, and for the brevity of the description, the explanation on their repeated features will be avoided.

[0067] According to the present invention, the first shock-absorbing spaces and the second shock-absorbing spaces are provided as air chambers, but in some cases, they may be filled with separate filling materials.

[0068] Referring to FIG. 9, that is, the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220** are filled with filling materials **510** and **520**. The kinds of features of the filling materials **510** and **520** may be varied in accordance with their requirements and design specifications, and therefore, the present invention is not limited to the kinds and features of the filling materials **510** and **520**. For example, the filling materials **510** and **520** filled into the first shock-absorbing spaces **120** and the second shock-absorbing spaces **220** are made of an ultra light material such as urethane foam.

[0069] The above structure previously prevents foreign matters such as sand, gravels and the like from entering the first shock-absorbing spaces 120 and the second shock-absorbing spaces 220, thereby completely keeping the cushion force and the shock absorption performance from being diminished.

[0070] FIG. 10 is a bottom view showing a lightweight shoe sole according to another exemplary embodiment of the present invention, FIG. 11 is a side view showing the lightweight shoe sole of FIG. 10, FIG. 12 is a sectional view taken along the line D-D of FIG. 10, and FIG. 13 is a sectional view taken along the line E-E of FIG. 10.

[0071] Referring to FIGS. 10 to 13, a lightweight shoe sole having high resilience largely includes a reinforcing member 3300, a first midsole 3100, and a second midsole 3200.

[0072] The reinforcing member 3300 includes a reinforcing plate 3310 interposed between the first midsole 3100 and the second midsole 3200 and reinforcing side walls 3320 adapted to partially surround the side surfaces of the second midsole 3200. The reinforcing side walls 3320 are injected integrally with the reinforcing plate 3310 and desirably are made of a transparent material to permit the structure of the second midsole 3200 disposed at the inside thereof to be seen to the outside.

[0073] The first midsole 3100 is located on the underside of the reinforcing member 3300 and has first protrusions 3110 formed integrally with the top surface thereof. The first midsole 3100 is adapted to allow the outside surface of the reinforcing member 3300 on which the reinforcing side walls 3320 are formed to be partially accommodated thereinto and further to allow the reinforcing member 3300 and the second midsole 3200 in the regions where the first protrusions 3110 are not formed to be partially seen.

[0074] The second midsole 3200 is located on the top of the reinforcing member 3300 and has second protrusions 3210 formed integrally with the underside thereof.

[0075] The first protrusions 3110 and the second protrusions 3210 are formed to a form of a post in the regions where they are not laid up and down on each other, and as shown in FIGS. 12 and 13, they support the reinforcing plate 3310.

[0076] In more detail, as shown in FIG. 12, the first protrusions 3110 are located in the middle of the sole, and second shock-absorbing spaces 3220 are formed over the first protrusions 3110 in such a manner as to up and down correspond to the first protrusions 3110. At the same time, the second protrusions 3210 are formed on the left and right sides of the second shock-absorbing spaces 3220, and first shock-absorbing spaces 3120 are formed under the second protrusions 3210 in such a manner as to up and down correspond to the second protrusions 3210. When viewed at the sectional position of FIG. 12, the reinforcing member 3300 is seen to the outside through the first shock-absorbing spaces 3120.

[0077] In FIG. 13, on the other hand, both sides of the reinforcing member 3300 are supported by means of the first midsole 3100, and the center thereof is not supported. That is, the first protrusions 3110 are formed on the left and right sides of the first midsole 3100, and the second shock-absorbing spaces 3220 are provided over the first protrusions 3110 in such a manner as to be laid up and down on each other. At the same time, the second protrusions 3210 are provided between the second shock-absorbing spaces 3220, and in this case, the second protrusions 3210 have a separate space formed thereinto so as to help the weight of the shoe sole light. The first

shock-absorbing spaces 3120 are provided under the second protrusions 3210 in such a manner as to be laid up and down on each other.

[0078] The reinforcing side walls 3320 serve to block the second shock-absorbing spaces 3220 from the outside and to prevent foreign matters from entering the second shock-absorbing spaces 3220. Furthermore, the reinforcing side walls 3320 are located between the first midsole 3100 and the second midsole 3200 to permit the rear portion of the second midsole 3200 to be accommodated in a shape of U-like section, thereby suppressing the twisting of the shoe sole occurring during walking and running and thus ensuring the walking and running in a more stable manner.

[0079] Additionally, the reinforcing side walls 3320 may be extended to the lower portion of the side surfaces of the upper part of the shoe so as to partially support the lower portion of the upper part of the shoe, thereby helping the wearer walk and run stably.

[0080] Although a few exemplary embodiments of the present invention have been shown and described, the present invention is not limited to the described exemplary embodiments. Instead, it would be appreciated by those skilled in the art that changes may be made to these exemplary embodiments without departing from the principles and spirit of the invention, the scope of which is defined by the claims and their equivalents.

1. A lightweight shoe sole having a structure for shock absorption and rebound resilience, comprising:

a reinforcing member;

a first midsole having first protrusions formed integrally therewith, the first protrusions being supported on one surface of the reinforcing member; and

a second midsole having second protrusions formed integrally therewith, the second protrusions being supported on the other surface of the reinforcing member,

wherein the first protrusions and the second protrusions are supported by means of the reinforcing member in non-overlapping regions therebetween.

2. The lightweight shoe sole according to claim 1, wherein the reinforcing member is made of a high resilient material having relatively higher resilience than the first midsole and the second midsole.

3. The lightweight shoe sole according to claim 1, wherein the first protrusions of the first midsole are spaced apart from each other, while the second protrusions of the second midsole are spaced apart from each other, and a first shock-absorbing space is formed between the neighboring first protrusions, while a second shock-absorbing space is formed between the neighboring second protrusions, so that the first protrusions are supported on the second shock-absorbing spaces by means of the reinforcing member, and the second protrusions are supported on the first shock-absorbing spaces by means of the reinforcing member.

4. The lightweight shoe sole according to claim 3, wherein at least any ones of the first shock-absorbing spaces and the second shock-absorbing spaces are formed in such a manner as to communicate with the outside.

5. The lightweight shoe sole according to claim 3, wherein the first protrusions and the second protrusions are provided in an integral form located continuously in the width directions of the first midsole and the second midsole or in a plural form located discontinuously in the width directions thereof.

6. The lightweight shoe sole according to claim 3, wherein at least any ones of the first shock-absorbing spaces and the second shock-absorbing spaces are filled with a filling material.

7. The lightweight shoe sole according to claim 3, wherein the reinforcing member comprises:

a reinforcing plate against which the first protrusions and the second protrusions are supported; and reinforcing side walls formed integrally with the side end portion of the reinforcing plate to surround the side surfaces of at least one of the first midsole and the second midsole.

8. The lightweight shoe sole according to claim 7, wherein the reinforcing side walls surround the whole or partial side surfaces of the first midsole or the second midsole to prevent foreign matters from entering the first shock-absorbing spaces or the second shock-absorbing spaces.

9. The lightweight shoe sole according to claim 3, wherein the reinforcing member comprises:

a reinforcing plate against which the first protrusions and the second protrusions are supported; and reinforcing side walls formed integrally with the side end portion of the reinforcing plate to surround the side surfaces of one of the first midsole and the second mid-

sole, so that the other is adapted to cover the whole or partial outside surfaces of the reinforcing side walls.

10. The lightweight shoe sole according to claim 1, wherein the reinforcing member comprises:

a reinforcing plate against which the first protrusions and the second protrusions are supported; and reinforcing ribs extended integrally from the side end portion of the reinforcing plate, while being spaced apart from the reinforcing plate by a given distance, so as to surround the side surfaces of at least one of the first midsole and the second midsole.

11. The lightweight shoe sole according to claim 10, wherein the reinforcing ribs have a relatively higher thickness than the reinforcing plate.

12. The lightweight shoe sole according to claim 10, wherein the reinforcing plate has incised portions formed thereon.

13. The lightweight shoe sole according to claim 1, wherein the first midsole or the second midsole disposed on the underside of the reinforcing member has exposure holes formed thereon, through which a portion of the reinforcing member is exposed from the underside surface of the first midsole or the second midsole.

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