

BREATHABLE AND COOLING SHOE

TECHNICAL FIELD

[0001] The present invention relates to a breathable and cooling shoe, and more particularly to a shoe in the technical field of footwear.

5 BACKGROUND OF THE INVENTION

[0002] Shoes are essential daily necessities in people's lives. Traditional footwear, during summer or in high-temperature environments, often causes feet to sweat and overheat, resulting in discomfort, stuffiness, and even bacterial growth, which significantly affects
10 daily life and work. With the improvement of living standards, people's requirements for shoes have increased, with growing demands for enhanced functionality. Increasing attention is being paid to foot protection and care. At present, most designs focus on improving breathability, typically utilizing highly breathable materials such as mesh fabric, breathable leather, or specialized material structures to allow natural air circulation and reduce internal
15 shoe temperature. However, the overall breathability remains limited. Some designs incorporate exhaust structures within the sole to discharge internal air to a certain extent, but heat accumulation inside the shoe persists, resulting in suboptimal wearing comfort.

[0003] In view of the foregoing issues, the present invention provides a shoe with improved breathability and cooling performance.

20 [0004] SUMMARY OF THE INVENTION

[0005] In view of the deficiencies in the prior art, the present invention aims to provide a breathable and cooling shoe to address the aforementioned problems.

[0006] To achieve the above objective, the present invention adopts the following technical solution:

[0007] A breathable and cooling shoe includes a sole. The sole is provided with an exhaust channel for communicating the interior of the shoe with the external environment. A heat-dissipating component is disposed on the exhaust channel. The heat-dissipating component does not block the exhaust channel and is arranged in the direction of exhaust flow to
5 discharge the heat from the heat-dissipating component through the exhaust channel during ventilation.

[0008] In a further embodiment, the upper surface of the sole is provided with a guide groove. The heat-dissipating component is mounted within the guide groove, which is in communication with the exhaust channel.

10 [0009] In a further embodiment, the exhaust channel includes an airway port located within the sole, an exhaust outlet located on the outer side of the sole, and an exhaust passage connecting the airway port and the exhaust outlet.

[0010] In a further embodiment, the guide groove is disposed at the airway port. The heat-dissipating component is installed within the guide groove, with a heat-dissipating end of the
15 heat-dissipating component positioned above the airway port.

[0011] In a further embodiment, the heat-dissipating component is a strip-shaped heat dissipation tube, which has a sealed hollow structure.

[0012] In a further embodiment, the interior of the heat dissipation tube is provided with a water-absorbing material layer along the inner wall and a cooling liquid filled within the
20 water-absorbing material layer.

[0013] In a further embodiment, the guide groove is arranged at the exhaust passage and extends downward into communication with the exhaust passage. The heat-dissipating component is positioned within the guide groove, with the heat-dissipating end of the heat-dissipating component located inside the exhaust passage.

[0014] In a further embodiment, the heat-dissipating component includes a base plate and heat-dissipating fins extending downward from the base plate. The base plate is disposed on the upper surface of the sole, and the fins are arranged within the exhaust passage.

5 [0015] In a further embodiment, the heat-dissipating fins comprise parallel fins spaced apart from each other to form air-guiding slots between adjacent fins. The openings of the air-guiding slots are oriented in the same direction as the exhaust outlet.

[0016] In a further embodiment, the guide groove is also provided with a fixing structure for securing the heat-dissipating component.

10 [0017] In a further embodiment, the fixing structure comprises an annular seat. The heat-dissipating component is provided with an extending edge that is engaged with the annular seat. The heat-dissipating fins pass through the annular seat and extend into the exhaust channel.

[0018] In a further embodiment, the upper surface of the heat-dissipating component is further covered with a non-metallic thermally conductive layer.

15 [0019] In a further embodiment, the non-metallic thermally conductive layer is made of silicone or comprises a graphene coating applied to the surface of the heat-dissipating component.

ADVANTAGES OF THE INVENTION

20 [0020] In the present invention, a heat-dissipating component is added in the exhaust direction of the exhaust channel. During the process of air being exhausted or drawn in through the exhaust channel, the internal heat of the shoe can be more rapidly transferred and discharged to the outside via the heat-dissipating component, effectively lowering the internal temperature of the shoe and providing a cooler and more comfortable wearing experience.

[0021] In one embodiment of the present invention, the heat-dissipating component comprises heat-dissipating fins arranged in parallel and spaced apart, forming multiple airflow channels, thereby enhancing the heat dissipation effect.

[0022] In another embodiment, the heat-dissipating component is a heat conduction tube; the heat conduction tube contains a cooling liquid and a water-absorbing material. Based on the principles of heat pipe technology, this configuration achieves superior heat dissipation performance.

BRIEF DESCRIPTION OF DRAWINGS

[0023] Other features, objectives, and advantages of the present invention will become more apparent from the following detailed description of non-limiting embodiments with reference to the accompanying drawings:

[0024] FIG. 1 is a schematic diagram of a breathable and cooling shoe according to Embodiment 1 of the present invention;

[0025] FIG. 2 is a schematic assembly diagram of the breathable and cooling shoe according to Embodiment 1 of the present invention;

[0026] FIG. 3 is a schematic diagram of a breathable and cooling shoe according to Embodiment 2 of the present invention;

[0027] FIG. 4 is a schematic assembly diagram of the breathable and cooling shoe according to Embodiment 2 of the present invention;

[0028] FIG. 5 is a schematic diagram of the fixing structure in the breathable and cooling shoe according to Embodiment 2 of the present invention;

[0029] FIG. 6 is a schematic diagram of a breathable and cooling shoe according to Embodiment 3 of the present invention;

[0030] FIG. 7 is a schematic assembly diagram of the breathable and cooling shoe according to Embodiment 3 of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0031] To facilitate a better understanding of the technical means, inventive features,

5 objectives, and effects of the present invention, the following specific embodiments are provided for further illustration.

[0032] Embodiment 1:

[0033] Please refer to FIGS. 1 and 2. A breathable and cooling shoe includes a sole. The sole is provided with an exhaust channel for connecting the interior of the shoe with the external
10 environment. A heat-dissipating component 2 is disposed along the exhaust direction within the exhaust channel without obstructing it, allowing the heat of the heat-dissipating component 2 to be expelled through the exhaust channel during air discharge. In this embodiment, the exhaust channel includes an airway port 11 positioned inside the sole, an exhaust outlet 12 on the outer side of the sole, and an exhaust passage 13 connecting the
15 airway port 11 and the exhaust outlet 12. A gas chamber 14 is further arranged on the exhaust passage 13. The airway port 11 functions as an intake port. When the user steps down, pressure is applied to the sole, compressing the gas chamber 14 and forcing airflow through the exhaust passage 13 to be expelled via the exhaust outlet 12. Conversely, when the foot is lifted, the gas chamber 14 returns to its original shape, drawing air from inside the shoe
20 through the airway port 11 and exhaust passage 13 back into the gas chamber 14. When the lifted foot next makes contact with the ground, the gas chamber 14 is compressed again, and airflow is expelled from the exhaust outlet 12 via the exhaust passage 13. To enhance exhaust efficiency, the exhaust passage 13 may be configured with a Tesla valve structure, which has a unidirectional flow characteristic. In this embodiment, the flow direction from the airway

port 11 to the exhaust outlet 12 corresponds to the low-resistance direction. The upper surface of the sole is provided with a guide groove 3. The heat-dissipating component 2 is mounted within the guide groove 3, which is in communication with the exhaust channel. The guide groove 3 is located at the airway port 11, and the heat-dissipating component 2 is installed therein with its heat-dissipating end positioned above the airway port 11. The heat-dissipating component 2 is a strip-shaped heat dissipation tube having a sealed hollow structure. Inside the heat dissipation tube, a water-absorbing material layer is arranged along the inner wall, and a cooling liquid is filled within the water-absorbing layer. The upper end of the heat dissipation tube is exposed inside the shoe and comes into contact with the sole of the foot.

Heat from the foot and the shoe interior causes the upper section of the tube to warm, leading to evaporation and diffusion of the cooling liquid toward the lower end of the tube, where the heat is released. When the gas chamber 14 returns to its original shape, air from inside the shoe is drawn through the airway port 11 and exhaust passage 13 into the gas chamber 14. At this moment, the airway port 11 generates a strong airflow that carries the released heat from the lower end of the heat dissipation tube through the exhaust passage 13 and out of the exhaust outlet 12, thereby achieving the effect of ventilated heat dissipation and cooling.

Since the upper surface of the heat dissipation tube is in contact with the foot, it is further coated with a non-metallic thermally conductive layer—such as silicone or a graphene coating applied to the planar surface of the heat-dissipating component—to prevent discomfort caused by excessive coldness or hardness of metal materials.

[0034] Embodiment 2:

[0035] Please refer to FIGS. 3 to 5. This embodiment provides a breathable and cooling shoe including a sole. The sole is provided with an exhaust channel, a heat-dissipating component 2, and a guide groove 3, which are configured similarly to those in Embodiment 1. However, unlike Embodiment 1, the guide groove 3 is arranged at the exhaust passage 13 and extends

downward to communicate with the exhaust passage 13. The heat-dissipating component 2 is positioned within the guide groove 3, with its heat-dissipating end located inside the exhaust passage 13. The heat-dissipating component 2 comprises a base plate 21 and heat-dissipating fins 22 extending downward from the base plate 21. The base plate 21 and fins 22 are made of metal. The base plate 21 is disposed on the upper surface of the sole and positioned inside the shoe, in contact with the sole of the foot. The heat-dissipating fins 22 are arranged within the exhaust passage 13. The heat-dissipating fins 22 are formed of parallel fins spaced apart from one another, creating air-guiding channels 23 between adjacent fins. The openings of the air-guiding channels 23 are oriented in the same direction as the exhaust outlet 12, enhancing heat dissipation. When the base plate 21 comes into contact with the heat from the foot and the interior of the shoe, thermal conduction transfers the heat to the fins 22. As the gas chamber 14 returns to its original shape, air from within the shoe is drawn through the airway port 11 and into the exhaust passage 13. The airflow then passes across the surface of the fins 22, carrying away the heat and discharging it through the exhaust outlet 12, thereby achieving effective ventilated cooling. To prevent the heat-dissipating component 2 from shifting or detaching, the guide groove 3 is further provided with a fixing structure. The fixing structure includes an annular seat formed with the guide groove 3. The heat-dissipating component 2 is provided with an extending edge 24, which is engaged with the annular seat. The annular seat includes a groove 31 into which the extending edge 24 is locked. The fins 22 pass through the annular seat and extend into the exhaust passage. Since the upper surface of the base plate 21 is in direct contact with the foot, it is further coated with a non-metallic thermally conductive layer—such as silicone or a graphene coating applied to the surface—to prevent discomfort from excessive coldness or hardness of the metal.

[0036] Embodiment 3:

[0037] Please refer to FIGS. 6 and 7. This embodiment provides a breathable and cooling shoe including a sole. The sole is provided with an exhaust channel, heat-dissipating components 2, and guide grooves 3, which are configured similarly to those in Embodiment 1. However, unlike Embodiment 1, two guide grooves 3 are provided - one at the airway port 11 and another at the exhaust passage 13. Two heat-dissipating components 2 are employed, including a heat dissipation tube and heat dissipation fins, which are respectively mounted at the airway port 11 and the exhaust passage 13. When the gas chamber 14 returns to its original state, air from inside the shoe is drawn through the airway port 11 and into the exhaust passage 13. At this moment, a strong airflow is generated at the airway port 11. The heat released from the lower end of the heat dissipation tube is carried by the airflow through the exhaust passage 13 and expelled from the exhaust outlet 12. The airflow also passes over the surface of the heat dissipation fins 22, carrying their heat out through the same passage and outlet. This achieves a combined effect of exhaust, heat dissipation, and cooling.

[0038] Furthermore, it should be understood that although the present specification is described in terms of embodiments, it is not intended that each embodiment includes only one independent technical solution. The manner of description is for clarity only. Those skilled in the art should consider the specification as a whole, and the technical features of the various embodiments may be appropriately combined to form other embodiments understood by those skilled in the art.

CLAIMS

1. A breathable and cooling shoe, comprising a sole; wherein the sole is provided with an exhaust channel configured to communicate the interior of the shoe with the external environment; characterized in that a heat-dissipating component is disposed on the exhaust
5 channel, the heat-dissipating component being non-obstructive to the exhaust channel and positioned in the exhaust direction thereof, so as to discharge heat from the heat-dissipating component via the exhaust channel during air ventilation.

2. The breathable and cooling shoe according to claim 1, characterized in that an upper
10 surface of the sole is provided with a guide groove; the heat-dissipating component is mounted within the guide groove, which is in communication with the exhaust channel.

3. The breathable and cooling shoe according to claim 2, characterized in that the exhaust channel comprises an airway port located within the sole, an exhaust outlet located
15 on an outer side of the sole, and an exhaust passage connecting the airway port and the exhaust outlet.

4. The breathable and cooling shoe according to claim 3, characterized in that the guide groove is disposed at the airway port, the heat-dissipating component is installed in the guide
20 groove, and a heat-dissipating end of the heat-dissipating component is located above the airway port.

5. The breathable and cooling shoe according to claim 4, characterized in that the heat-dissipating component comprises a strip-shaped heat dissipation tube, and the heat dissipation
25 tube has a sealed hollow structure.

6. The breathable and cooling shoe according to claim 5, characterized in that the interior of the heat dissipation tube is provided with a water-absorbing material layer along an inner wall thereof, and a cooling liquid is filled within the water-absorbing material layer.

5

7. The breathable and cooling shoe according to claim 3, characterized in that the guide groove is disposed at the exhaust passage and extends downward into communication with the exhaust passage; the heat-dissipating component is positioned in the guide groove, with its heat-dissipating end located inside the exhaust passage.

10

8. The breathable and cooling shoe according to claim 7, characterized in that the heat-dissipating component comprises a base plate and heat-dissipating fins extending downward from the base plate; the base plate is disposed on an upper surface of the sole, and the heat-dissipating fins are disposed within the exhaust passage.

15

9. The breathable and cooling shoe according to claim 8, characterized in that the heat-dissipating fins comprise parallel fins spaced apart from one another, forming air-guiding slots between adjacent fins; the openings of the air-guiding slots are oriented in the same direction as the exhaust outlet.

20

10. The breathable and cooling shoe according to any one of claims 7 to 9, characterized in that the guide groove is further provided with a fixing structure configured to secure the heat-dissipating component.

11. The breathable and cooling shoe according to claim 10, characterized in that the fixing structure comprises an annular seat; the heat-dissipating component includes an extending edge engaged with the annular seat; the heat-dissipating fins pass through the annular seat and extend into the exhaust channel.

5

12. The breathable and cooling shoe according to any one of claims 4 to 9, characterized in that an upper surface of the heat-dissipating component is further coated with a non-metallic thermally conductive layer.

10

13. The breathable and cooling shoe according to claim 12, characterized in that the non-metallic thermally conductive layer comprises silicone or a graphene coating applied to a surface of the heat-dissipating component.