(54) Title: A AIR SUPPLY DEVICE OF SHOES WITH RETRACTABLE WHEELS

(57) Abstract: An air supply device of a wheel-mounted shoe which can supply ambient air into the interior of the shoe by continuously suck the ambient air in by use of the rotating force of the frictional roller interposed between adjacent ones of the wheels rotatably mounted to the bracket of the outer sole of the shoe, irrespective of the rotating direction of the wheels. Accordingly, the air supply device eliminates uncomfortableness caused by sweat and odor generated from the user in the interior of the shoe, to maintain the interior of the shoe in a pleasant state, thereby helping the user’s foot health.
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An air supply device of shoes with retractable wheels

The present invention relates to a shoe with wheels. More particularly, the present invention relates to an air supply device of a shoe with wheels which forcibly sucks ambient air, using rotating forces of the wheels and a frictional roller mounted to an outer sole of the shoe, to supply the sucked air into the interior of the shoe, thereby being capable of removing sweat and odor generated from the user in the interior of the shoe, and thus, maintaining the interior of the shoe in a pleasant state, thereby helping the user’s foot health.

FIG. 1 is a side view illustrating the configuration of a general in-line skate. The in-line skate shown in FIG. 1 is an exercise mechanism, which is also called a “roller blade”. As shown in FIG. 1, the in-line skate includes a shoe 10, a plurality of wheels 12 mounted to a bracket 11 fixed to the lower surface of an outer sole of the shoe 10 such that each wheel 12 is rotatable about a shaft 13, and a brake 14 mounted to a rear end of the bracket 11. In accordance with this configuration, the user who wears the in-line skate can travel on the road at high speed.

Also, various structures modified from such an in-line skate or roller blade have been developed. For example, there is a wheel-mounted shoe in which a wheel is mounted to a rear portion of an outer sole of the shoe to allow the user to not only perform walking, but also to perform movement, using the wheel. Such a wheel-mounted shoe is called a “Heelys shoe”. Also, there is a functional shoe in which a wheel is retractably mounted to an outer sole of the shoe so that the shoe has both the general shoe function and the roller blade function.
As an example of inventions to improve the above-mentioned roller blade, Korean Utility Model No. 20-0308234 discloses a structure in which a damper is provided at each wheel to reduce impact generated when the wheel comes into contact with the ground. Korean Utility Model No. 20-0283620 discloses a roller blade having a structure to provide cushion to the roller blade and to provide stability. Also, Korean Utility Model No. 20-0266726 discloses a roller blade in which a light emitting element is mounted to allow the user to have a frontal visibility at night or in dark places.

Also, there are inventions relating to shoes having retractable wheels. For example, Korean Utility Model No. 20-0225828 discloses a structure in which rollers are mounted to a bracket fixed to the outer sole of a shoe such that the rollers are received in recesses formed at front and rear portions of the outer sole and are extendable from the recesses, respectively. Korean Utility Model No. 20-0301227 discloses a functional shoe in which a recess is formed at the outer sole of the shoe to carry a roller device having a wheel assembly. In the latter case, the wheel assembly is selectively protruded from the recess in accordance with operation of a handle so that the shoe can selectively perform the general shoe function and the roller blade function.

In most shoe structures in which a roller blade is incorporated, as mentioned above, natural circulation of air in the shoe is carried out through air ventilation ports formed at side surfaces or the upper surface of the shoe. For this reason, the conventional shoe structures cannot obtain an effective air circulation effect, so that sweat and odor generated from the user during exercise cannot be effectively discharged from the shoe. As a result, the user may feel uncomfortable. Furthermore, when the shoe is used for a prolonged period of time, it may injure the user's foot.

In order to solve these problems, various proposals have been made. For example, Korean Utility Model No. 20-0320268 discloses a roller blade in which ambient air is forcibly supplied into the interior of a shoe through a blower using the rotating force of wheels of the roller blade. Also, Korean Utility Model No. 20-0314254 discloses a structure in which air ventilation ports are formed at a chassis mounted to the outer sole of a shoe to supply air into the interior of the shoe.
In the former air ventilation structure, however, there is a difficulty in molding and assembling processes because a separate blower is mounted to the bracket of the roller blade, and the transmission of the rotating force is achieved through connecting means such as a belt, chain, or gears mounted to the shafts of the wheels. Furthermore, an increase in manufacturing costs occurs because a number of elements must be used.

In the latter air ventilation structure, it is possible to reduce the manufacturing costs because the structure is relatively simple, as compared to the former case. However, there is a degradation in air supply effect because ambient air is naturally circulated into the interior of the shoe through the air ventilation ports formed at the chassis.

【Disclosure】
【Technical Problem】

The present invention has been made in view of the above-mentioned problems, and it is an object to provide an air supply device of a shoe with wheels which includes a frictional roller mounted to an outer sole of the shoe between adjacent ones of the wheels, air sucking means provided at opposite ends of a shaft extending laterally through the frictional roller to continuously supply ambient air into the interior of the shoe during rotation of the wheels, irrespective of the rotation direction of the wheels, so that the air supply device can eliminate uncomfortableness caused by sweat and odor generated from the user in the interior of the shoe, to maintain the interior of the shoe in a pleasant state, thereby helping the user’s foot health.

【Technical Solution】

In accordance with one aspect, the present invention provides an air supply device of a wheel-mounted shoe comprising: a fixed plate mounted to a lower surface of a top plate portion of a bracket fixed to an outer sole of the wheel-mounted shoe by fixing members; a housing coupled to the fixed plate such that the housing is vertically movable while being elastically supported by an elastic
member; a frictional roller rotatably coupled to the housing by a shaft such that the frictional roller is in close contact with a circumferential surface of at least one of wheels rotatably mounted to the bracket; air sucking means to suck ambient air in when the frictional roller rotates; and air ventilation means to supply the air sucked in by the air sucking means into the interior of the shoe.

The fixed plate may have a guide member formed at a lower surface of the fixed plate. The guide member may have a pair of legs defining a recess therein so that the guide member is coupled with the housing. The legs of the guide member may be provided with stoppers formed at respective lower ends of the legs to prevent the housing coupled to the guide member from being separated from the guide member.

A spring may be interposed between the fixed plate and the housing. The housing may have a flange formed at a peripheral edge of an upper end of the housing to prevent the housing from being separated from the guide member in a state of being coupled with the guide member, and a spring receiving recess formed at an upper portion of the housing to receive the spring. The housing may have a roller receiving hole centrally formed at a lower portion of the housing to receive the frictional roller such that the frictional roller is fitted around the shaft in the roller receiving hole.

The air sucking means may comprise: two sets of blades mounted to opposite ends of the shaft, respectively; casings provided at the lower portion of the housing to circumferentially surround respective sets of the blades; and caps fitted around respective outer ends of the casings. An air outlet may be formed at a portion of a circumferential wall of each casing to discharge air sucked into the casing in accordance with rotation of the blades received in the casing. An air inlet may be formed at a central portion of each cap to allow ambient air to be sucked into the interior of an associated one of the casings in accordance with the rotation of the blades received in the associated casing. The sets of the blades may be mounted to respective ends of the shaft such that the blade sets rotate in opposite directions, respectively.

The air ventilation means may comprise: first connecting members respectively connected to the air outlets of the casings provided at the lower portion of the housing; air tubes respectively connected to the first connecting members; a
second connecting member connected to the air tubes to unify air flows respectively discharged from the air tubes; and an air supply tube connected to the second connecting member to communicate the second connecting member and the interior of the shoe, and thus, to supply the air discharged from the second connecting member into the interior of the shoe. Each of the first connecting members may have a cylindrical tube structure in which a central portion of the structure has a diameter smaller than opposite ends of the structure. The second connecting member may include branched tubes forming one portion of the second connecting member to be connected with the air tubes, respectively, and a unified tube forming the other portion of the second connecting member to unify air flows respectively discharged from the air tubes and then to discharge the unified air into the air supply tube.

A cut-off valve may be mounted in the second connecting member such that the cut-off valve is hingable about a hinge to selectively open one of the branched tubes while closing the other branched tube. The hinging operation of the cut-off valve about the hinge may be achieved by air discharged from one of the air tubes. A stopper may be provided at each branched tube to limit a hinging angle of the cut-off valve.

In accordance with another aspect, the present invention provides an air supply device of a wheel-mounted shoe comprising: a fixed plate mounted to a lower surface of a top plate portion of a bracket fixed to an outer sole of the wheel-mounted shoe by fixing members, and provided with a pair of guide rods respectively mounted with springs; a moving plate elastically mounted to the fixed plate in a state of being fitted around the guide rods such that the moving plate is vertically movable, the moving plate being provided with a freely-rotatable hollow shaft mounted to a lower portion of the moving plate; a frictional roller fixedly mounted on the shaft such that the frictional roller is in close contact with a circumferential surface of at least one of wheels rotatably mounted to the bracket; air sucking means to suck ambient air in when the frictional roller rotates; and air ventilation means to supply the air sucked in by the air sucking means into the interior of the shoe through the shaft.

The air sucking means may comprise a casing formed at a portion of a circumferential surface of the shaft positioned in a recess formed at the frictional
roller, and provided with an air inlet. Alternatively, the air sucking means may comprise a casing formed at one end of the shaft, and provided with an air inlet.

The air ventilation means may comprise: a through hole formed at the shaft to communicate with the air sucking means; an air passage defined in the shaft to communicate with the air sucking means via the through hole; a box-shaped connector provided at one end of the shaft, and connected with the air passage at one side wall of the connector; and an elongated tube connected to a top wall of the connector while extending to the interior of the shoe through the outer sole of the shoe to supply, into the interior of the shoe, air introduced into the connector.

Seal members may be fitted around an end of the shaft and an end of the elongated tube connected with the connector, while being retained by support plates mounted to the connector, respectively, to prevent leakage of air.

A cut-off valve may be mounted between the connector and the elongated tube to forcibly cut off flow of air.

【Advantageous Effects】

The present invention provides an effect of eliminating uncomfortableness caused by sweat and odor generated from the user in the interior of the shoe, to maintain the interior of the shoe in a pleasant state, thereby helping the user’s foot health by mounting the frictional roller to the outer sole of the shoe between adjacent ones of the wheels, and providing the air sucking means at opposite ends of the shaft extending laterally through the frictional roller to continuously supply ambient air into the interior of the shoe during rotation of the wheels, irrespective of the rotation direction of the wheels.

【Description of Drawings】

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

FIG. 1 is a side view illustrating the configuration of a general in-line skate;
FIG. 2 is a schematic view illustrating an air supply device of a shoe with
wheels in accordance with a preferred embodiment of the present invention;

FIGS. 3 and 4 are sectional and side views of the air supply device shown in FIG. 2, respectively;

FIG. 5 is a sectional view illustrating a state in which air is sucked by air sucking means according to the illustrated embodiment of the present invention;

FIG. 6 is a schematic view illustrating an airflow caused by the air sucking means according to the illustrated embodiment of the present invention;

FIGS. 7 and 8 are sectional views showing the inner structure of a second connecting member;

FIGS. 9 and 10 are schematic views showing functional relation between a frictional roller and wheels;

FIG. 11 is a schematic view illustrating an air supply device according to another embodiment of the present invention;

FIGS. 12 and 13 are sectional views illustrating functional relation between a frictional roller and a connecting member shown in FIG. 11, respectively;

FIG. 14 is an enlarged sectional view showing a connecting structure for the connector, shaft and elongated tube shown in FIG. 11; and

FIG. 15 is a schematic view illustrating an air supply device according to another embodiment of the present invention, which includes a hollow shaft, and a frictional roller and a casing mounted on the hollow shaft which are modified versions of those of FIG. 11.

【Best Mode】

Hereinafter, preferred embodiments of the present invention will be described with reference to the annexed drawings. In the following description of the present invention, a detailed description of known functions and configurations incorporated herein will be omitted when it may make the subject matter of the present invention rather unclear.

FIG. 2 is a schematic view illustrating an air supply device of a shoe with wheels in accordance with a preferred embodiment of the present invention.

As shown in FIG. 2, the wheel-mounted shoe 10, in which the air supply device according to the illustrated embodiment of the present invention is provided,
includes a bracket 11 attached to an outer sole of the shoe 10, a plurality of wheels 12 rotatably fitted around shafts 13 mounted to the bracket 11 in a longitudinally-aligned state, respectively, and a brake 14 mounted to a rear end of the bracket 11. The air supply device, which is adapted to supply air into the interior of the shoe, is interposed between adjacent ones of the wheels 12. The air supply device communicates with the interior of the shoe 10.

As shown in FIG. 2, the air supply device, which is adapted to supply air into the interior of the wheel-mounted shoe 10 having the above-described configuration, includes: a fixed plate 15 mounted to the lower surface of a top plate portion of the bracket 11 by means of fixing members 15a; a housing 20 coupled to the fixed plate 15 such that the housing 20 is vertically movable while being elastically supported by an elastic member 23; a frictional roller 32 rotatably coupled to the housing 20 by a shaft 29 such that the frictional roller 32 is in close contact with the circumferential surfaces of the associated wheels 12; air sucking means to suck ambient air in when the frictional roller 32 rotates; and air ventilation means to supply the air sucked in by the air sucking means into the interior of the shoe 10.

The configuration of the air supply device according to the illustrated embodiment of the present invention will be described in more detail with reference to FIG. 2.

The fixed plate 15 has a flat plate shape, and is mounted to the lower surface of the top plate portion of the bracket 11 fixed to the outer sole of the shoe 10. In particular, a guide member 16 is formed at the lower surface of the fixed plate 15. The guide member 16 has a pair of legs defining a recess therein so that the guide member 16 is coupled with the housing 20. Stoppers 17 are formed at respective lower ends of the legs of the guide member 16 in order to prevent the housing 20 coupled to the guide member 16 from being separated from the guide member 16.

The housing 20 has an upper portion having a rectangular cross-section while having an upper end formed with a flange 21 at a peripheral edge thereof to prevent the housing 20 from being separated from the guide member 16 in a state of being coupled with the guide member 16. The housing 20 also has a cylindrical lower portion to provide a pair of casings 25. A roller receiving hole 24 is formed
at a central portion of the housing 20 between the casings 25 to receive the frictional roller 32 such that the frictional roller 32 is fitted around the shaft 29 in the roller receiving hole 24. Bearings 30 are mounted in the casings 25 of the housing 20 such that the bearings 30 are fitted around opposite ends of the shaft 29, respectively, to allow the shaft 29 to rotate freely. Blades 29a are mounted to each end of the shaft 29. The blades 29a are received in the casings 25, respectively. As the elastic member, a spring 23 is interposed between the fixed plate 15 and the housing 20. The housing 20 is elastically supported by the spring 23 in a vertically-movable state. A spring receiving recess 22 is formed at the upper portion of the housing 20 to receive the spring 23.

In particular, the frictional roller 32, which is received in the roller receiving hole 24 of the housing 20, is interposed between adjacent ones of the wheels 12 fitted around respective shafts 13 fixed to the bracket 11. The frictional roller 32 is in close contact with the circumferential surfaces of the associated wheels 12, so that the frictional roller 32 receives the rotating force of the wheels 12, and thus, rotates in a certain direction.

FIGS. 3 and 4 are sectional and side views of the air supply device shown in FIG. 2, respectively. FIG. 5 is a sectional view illustrating a state in which air is sucked by the air sucking means according to the illustrated embodiment of the present invention. FIG. 6 is a schematic view illustrating an air flow caused by the air sucking means according to the illustrated embodiment of the present invention.

As described above, the air supply device includes the air sucking means to suck ambient air in when the frictional roller 32 rotates, and the air ventilation means to supply the air sucked in by the air sucking means into the interior of the shoe 10. Referring to FIG. 3, the air sucking means is arranged at opposite lateral ends of the lower portion of the housing 20, that is, at opposite sides of the roller receiving hole 24, to suck ambient air in during rotation of the frictional roller 32. The air sucking means comprises: two sets of blades 29a mounted to respective ends of the shaft 29; the casings 25 provided at the lower portion of the housing 20 to circumferentially surround respective sets of the blades 29a; and caps 27 fitted around respective outer ends of the casings 25.

An air outlet 26 is formed at a portion of a circumferential wall of each casing 25 to discharge air sucked into the casing 25 in accordance with rotation of
the blades 29a received in the casing 25. An air inlet 28 is formed at a central portion of each cap 27 to allow ambient air to be sucked into the interior of the associated casing 25 in accordance with the rotation of the associated blades 29a. The sets of the blades 29a are mounted to respective ends of the shaft 29 such that the blade sets rotate in opposite directions, respectively. Accordingly, the sets of the blades 29a can continuously suck ambient air in, irrespective of the rotation direction of the wheels 12.

Referring to FIGS. 4 to 6, the air ventilation means comprises: first connecting members 34 respectively connected to the air outlets 26 of the casings 25 provided at the lower portion of the housing 20; air tubes 35 respectively connected to the first connecting members 34; a second connecting member 36 connected to both the air tubes 35 to unify air flows respectively discharged from the air tubes 35; and an air supply tube 42 connected to the second connecting member 36 to communicate the second connecting member 36 and the interior of the shoe 10 so as to supply the air discharged from the second connecting member 36 into the interior of the shoe 10.

Each first connecting member 34 has a cylindrical tube structure in which the central portion has a diameter smaller than that of the opposite ends. The first connecting member 34 is connected between the air outlet 26 of the associated casing 25 and the associated air tube 35.

The second connecting member 36 has a Y-shaped structure including branched tubes 37 forming one portion of the second connecting member 36 to be connected with respective air tubes 35, and a unified tube 40 forming the other portion of the second connecting member 36 to unify air flows respectively discharged from the air tubes 35 and then to discharge the unified air into the air supply tube 42.

FIGS. 7 and 8 are sectional views showing the inner structure of the second connecting member 36. FIGS. 9 and 10 are schematic views showing functional relation between the wheels and the frictional roller.

Referring to FIGS. 7 and 8, a cut-off valve 39 is mounted in the second connecting member 36 at a region where the branched tubes 37 respectively connected with the air tubes 35 are connected to the unified tube 40. The cut-off valve 39 is hingable about a hinge 38 to selectively open one of the branched tubes
37 while closing the other branched tube 37. In the illustrated case, the hinging operation of the cut-off valve 39 about the hinge 38 is achieved by air discharged from one of the air tubes 35. A stopper 37a is provided at a downstream end of each branched tube 37 to limit the hinging angle of the cut-off valve 39 and to completely seal the branched tube 37 in cooperation with the cut-off valve 39.

The air supply device, which has the above-described configuration in accordance with the illustrated embodiment of the present invention, can continuously supply ambient air into the interior of the shoe 10 during forward or backward movement of the user in a state of wearing a roller blade or in-line skate of FIG. 1, to which the air supply device is applied, irrespective of the rotation direction of the wheels 12, as shown in FIGS. 9 and 10.

Although the air supply device is interposed between selected adjacent ones of the wheels 12 in the illustrated embodiment, the air supply device may be arranged over a selected one of the wheels 12 such that the frictional roller 32 is in close contact with the selected wheel 12. Of course, the same function as that of the above-described case is obtained in this case.

Now, operation of the air supply device according to the above-described embodiment of the present invention will be described.

When the user moves in a state of wearing the wheel-mounted shoe 10, that is, the roller blade or in-line skate of FIG. 1, to which the air supply device having the above-described configuration is applied, the wheels 12 mounted on respective shafts 13 of the bracket 11 are rotated. As a result, the frictional roller 32, which is elastically in close contact with the associated wheels 12 between the associated wheels 12, is rotated together with the shaft 29 mounted in the roller receiving hole 24 of the housing 20.

When the shaft 29 rotates together with the frictional roller 32 in accordance with the rotating force of the wheels 12, the blades 29a arranged in the casings 25 of the housing 20 are rotated. In accordance with the rotation of the blades 29a, ambient air is sucked into the interior of a selected one of the casings 25 through the air inlet 28 formed at the central portion of the cap 27 fitted around the selected casing 25 because the blade sets of the casings 25 rotate in opposite directions, respectively. Subsequently, the ambient air sucked into the selected casing 25 is discharged into the first connecting member 34 connected to the air
outlet 26 of the casing 25, and is then discharged into the unified tube 40 after passing through the second connecting member 36 connected to the first connecting member 34, that is, the branched pipe 37 connected to the first connecting member 34, as shown in FIG. 7. At this time, by the air passing through the branched pipe 37, the cut-off valve 39 is hinged toward the other branched pipe 37, so that the branched pipe 37, through which the air passes, is opened to communicate with the unified tube 40.

The air discharged into the unified tube 40 is then supplied into the interior of the shoe 10 via the air supply tube 42 connected between the unified tube 40 and the interior of the shoe 10.

The cut-off valve 39, which is hingable about the hinge 38 in the second connecting member 36, is always maintained at a position opposite to the path, along which the sucked air flows. In the above-described case, the cut-off valve 39 comes into close contact with the stopper 37a of the other branched pipe 37, so that the air flowing from the opened branched pipe 37 toward the unified tube 40 cannot be introduced into the other branched tube 37.

Since the sets of the blades 29a respectively mounted in the casings 25 of the housing 20 have opposite mounting directions, ambient air is continuously supplied into the interior of the shoe 10 via one of the casings 25 and the air ventilation means, irrespective of the rotation direction of the wheels 12.

That is, although the wheels 12 are rotated in a forward or reverse direction when the user moves in a state of wearing the roller blade or in-line skate, one of the parts of the air sucking means respectively provided at opposite sides of the housing 20, operates in accordance with the rotation direction of the wheels 12. Thus, ambient air can be continuously supplied into the interior of the shoe 10.

【Mode for Invention】

FIG. 11 is a schematic view illustrating an air supply device according to another embodiment of the present invention. FIGS. 12 and 13 are sectional views illustrating functional relation between a frictional roller and a connecting member shown in FIG. 11, respectively.
As shown in FIG. 11, the air supply device according to the second embodiment of the present invention includes: a fixed plate 115 mounted to the lower surface of the top plate portion of the bracket 11 fixed to the outer sole of the wheel-mounted shoe 10 by means of fixing members 115a, and provided with a pair of guide rods 116 respectively mounted with springs 118; a moving plate 120 elastically mounted to the fixed plate 115 in a state of being fitted around the guide rods 116 such that the moving plate 120 is vertically movable, the moving plate 120 being provided, at a lower portion thereof, with a freely-rotatable hollow shaft 121; a frictional roller 125 fixedly mounted on the shaft 121 such that the frictional roller 125 is in close contact with the circumferential surface of a selected one of the wheels 12; air sucking means to suck ambient air in when the frictional roller 125 rotates; and air ventilation means to supply the air sucked in by the air sucking means into the interior of the shoe 10 through the shaft 121.

The configuration of the air supply device according to the illustrated embodiment of the present invention will be described in more detail with reference to FIG. 11.

In accordance with this embodiment, the air supply device is configured to supply air into the interior of the shoe 10 by arranging the frictional roller 125 to be elastically in close contact with the circumferential surface of a selected one of the wheels 12 freely rotatably mounted to the outer sole of the shoe 10, and providing the air sucking means and air ventilation means at the hollow shaft to rotate together with the frictional roller 125, and thus, to supply ambient air into a front portion of the interior of the shoe 10.

Referring to FIGS. 11 and 12, shafts 13 are freely rotatably mounted to the bracket 11 fixed to the outer sole of the shoe 10. The wheels 12 are fixedly mounted on the shafts 13, respectively, such that they rotate simultaneously.

The fixed plate 115 has a flat plate shape, and is mounted to the lower surface of the top plate portion of the bracket 11 by means of the fixing members 115a. The guide rods 116 are provided at the lower surface of the fixed plate 115 while being mounted with the springs 118, respectively.

The moving plate 120 has an inverted-U-shaped structure, and is elastically mounted to the guide rods 116 of the fixed plate 115 such that the moving plate 120 is always downwardly urged away from the fixed plate 115 by the springs 118.
The hollow shaft 121 is freely rotatably mounted to the lower portion of the moving plate 120. The frictional roller 125 is fixedly mounted on a central portion of the hollow shaft 121 such that the frictional roller 125 is in close contact with the circumferential surface of the associated wheel 12.

A recess 126 is formed at one side of the frictional roller 125. The air sucking means is arranged on a portion of the shaft 121 positioned in the recess 126 to suck ambient air in during rotation of the shaft 121.

The air sucking means comprises a casing 127 formed at a portion of the circumferential surface of the shaft 121 positioned in the recess 126 of the frictional roller 125, and provided with an air inlet 128, and a guide plate 129 mounted to the shaft 121 in the recess 126 to guide a flow of air generated in accordance with rotation of the frictional roller 125, and thus, the shaft 121, toward the casing 127.

When the wheels 12 are rotated in accordance with travel of the roller blade, the frictional roller 125 and shaft 121 are simultaneously rotated, thereby causing ambient air to be naturally sucked into the casing 127. Accordingly, the guide plate 129 may be dispensed with.

As shown in FIG. 13, the air ventilation means is arranged at one side of the air sucking means so that the ambient air sucked into the casing 127 is supplied into the interior of the shoe 10.

The air ventilation means comprises a through hole 122 formed at a portion of the shaft 121 to communicate with the casing 127, an air passage 122 defined in the shaft 121 to communicate with the casing 127 via the through hole 122, and a box-shaped connector 130 provided at one end of the shaft 121, and connected, at one side wall thereof, with the air passage 123.

The air ventilation means further comprises an elongated tube 131 connected to a top wall of the connector 130 while extending to a front portion of the interior of the shoe 10 through the outer sole of the shoe 10 to supply, into the interior of the shoe 10, the air introduced into the connector 130.

FIG. 14 is an enlarged sectional view showing a connecting structure for the connector, shaft and elongated tube shown in FIG. 11.

Referring to FIG. 14, seal members 132, which have a general structure such as an O-ring or oil seal, are fitted around the ends of the shaft 121 and elongated tube 131 connected with the connector 130, while being retained by
support plates 133 mounted to the connector 130, respectively, to prevent leakage of air.

A cut-off valve 135 is mounted between the connector 130 and the elongated tube 131 or in the elongated tube 131 to forcibly cut off the supply of ambient air into the shoe, if necessary.

FIG. 15 is a schematic view illustrating an air supply device according to another embodiment of the present invention, which includes a hollow shaft, and a frictional roller and a casing mounted on the hollow shaft which are modified versions of those of FIG. 11.

Referring to FIG. 15, a frictional roller 225 is mounted on a central portion of a hollow shaft 221, as in the case of FIG. 11. A casing 227, which has an air inlet 228, is mounted to one end of the shaft 221.

In this case, a through hole 222 is formed at a portion of the shaft 221, to which the casing 227 is mounted. An air passage 223 extends throughout the shaft 221 to communicate with the casing 227 via the through hole 222.

Now, operation of the air supply device according to the above-described embodiment of the present invention will be described.

When the user moves in a state of wearing the wheel-mounted shoe 10, that is, the roller blade or in-line skate of FIG. 1, to which the air supply device having the above-described configuration is applied, the shafts mounted to the bracket 11 are rotated together with the wheels 12. As a result, the frictional roller 125, which is in close contact with the circumferential surface of the associated wheel 12, is rotated together with the shaft 121.

Accordingly, ambient air is sucked into the casing 127 mounted on the shaft 121 in the recess 126 of the frictional roller 125 in accordance with the rotating force of the casing 127 and an operation of the guide plate 129 to guide the flow of air, as shown in FIG. 12. The sucked air is then introduced into the connector 130 connected to one end of the shaft 121 via the through hole 122 and air passage 123 formed at the shaft 121.

Subsequently, the air introduced into the connector 130 is supplied into the front portion of the interior of the shoe 10 via the elongated tube 131 connected to the upper wall of the connector 130, as shown in FIG. 13.
At this time, leakage of air is prevented by the seal members 132 fitted around the ends of the shaft 121 and elongated tube 131 connected to the connector 130, as shown in FIG. 14.

When it is desired to cut off introduction of air into the interior of the shoe 10, for example, in winter, this can be achieved by closing the cut-off valve 135 mounted in the elongated tube 131 or between the connector 130 and the elongated duct 131.

It is to be noted that the guide plate 129 mounted to the shaft 121 to guide the flow of air and the cut-off valve 135 mounted in the elongated tube 131 are not elements essentially required to implement the present invention. Even when these elements are dispensed with, the air sucked into the casing 127 can be supplied into the interior of the shoe 10.

The introduction of air into the shoe 10 may be cut off without using the cut-off valve 135, by configuring the connector 130 to be movable along the shaft 121, and thus, to be selectively disconnected from the air passage 123. In particular, the shaft 121 and elongated tube 131 may be directly connected without using the connector 130.

Similarly, in the case in which the frictional roller 225 is mounted on the central portion of the hollow shaft 221, and the casing 227 is mounted to one end of the shaft 221, ambient air is sucked into the air inlet 228 of the casing 227 in accordance with rotation of the shaft 221, and is then supplied into the interior of the shoe 10 via the through hole 222 and air passage 223 of the shaft 221.

Although the present invention has been described in conjunction with embodiments in which the present invention is applied to a general roller blade or in-line skate, the air supply device of the present invention can be easily applied to a shoe in which wheels are mounted to a bracket fixed to the outer sole of the shoe, or a shoe in which wheels are retractably mounted to the outer sole of the shoe. In such cases, the same function and effect as in the above-described case are obtained.

【Industrial Applicability】

As apparent from the above description, the air supply device of the wheel-mounted shoe according to the present invention can supply ambient air into the
interior of the shoe by continuously suck the ambient air in by use of the rotating force of the frictional roller interposed between adjacent ones of the wheels rotatably mounted to the bracket of the outer sole of the shoe, irrespective of the rotating direction of the wheels. Accordingly, the air supply device eliminates uncomfortableness caused by sweat and odor generated from the user in the interior of the shoe, to maintain the interior of the shoe in a pleasant state, thereby helping the user's foot health.

In addition, the air supply device of the wheel-mounted shoe according to the present invention can be easily applied to a general roller blade or in-line skate.
[CLAIMS]

[Claim 1] An air supply device of a wheel-mounted shoe comprising:
   a fixed plate mounted to a lower surface of a top plate portion of a bracket
   fixed to an outer sole of the wheel-mounted shoe by fixing members;
   a housing coupled to the fixed plate such that the housing is vertically
   movable while being elastically supported by an elastic member;
   a frictional roller rotatably coupled to the housing by a shaft such that the
   frictional roller is in close contact with a circumferential surface of at least one of
   wheels rotatably mounted to the bracket;
   air sucking means to suck ambient air in when the frictional roller rotates;
   and
   air ventilation means to supply the air sucked in by the air sucking means
   into the interior of the shoe.

[Claim 2] The air supply device according to claim 1, wherein the fixed plate has
   a guide member formed at a lower surface of the fixed plate, the guide member
   having a pair of legs defining a recess therein so that the guide member is coupled
   with the housing.

[Claim 3] The air supply device according to claim 2, wherein the legs of the
   guide member are provided with stoppers formed at respective lower ends of the
   legs to prevent the housing coupled to the guide member from being separated from
   the guide member.

[Claim 4] The air supply device according to claim 1, wherein a spring is
   interposed between the fixed plate and the housing.

[Claim 5] The air supply device according to claim 4, wherein the housing has
   a flange formed at a peripheral edge of an upper end of the housing to prevent the
   housing from being separated from the guide member in a state of being coupled
   with the guide member, and a spring receiving recess formed at an upper portion of
   the housing to receive the spring.
[Claim 6] The air supply device according to claim 1, wherein the housing has a roller receiving hole centrally formed at a lower portion of the housing to receive the frictional roller such that the frictional roller is fitted around the shaft in the roller receiving hole.

[Claim 7] The air supply device according to claim 1 or 6, wherein the air sucking means is arranged at opposite sides of the lower portion of the housing to suck ambient air in when the frictional roller rotates.

[Claim 8] The air supply device according to claim 1 or 7, wherein the air sucking means comprises:
- two sets of blades mounted to opposite ends of the shaft, respectively;
- casings provided at the lower portion of the housing to circumferentially surround respective sets of the blades; and
- caps fitted around respective outer ends of the casings.

[Claim 9] The air supply device according to claim 8, wherein an air outlet is formed at a portion of a circumferential wall of each casing to discharge air sucked into the casing in accordance with rotation of the blades received in the casing.

[Claim 10] The air supply device according to claim 8, wherein an air inlet is formed at a central portion of each cap to allow ambient air to be sucked into the interior of an associated one of the casings in accordance with the rotation of the blades received in the associated casing.

[Claim 11] The air supply device according to claim 8, wherein the sets of the blades are mounted to respective ends of the shaft such that the blade sets rotate in opposite directions, respectively.

[Claim 12] The air supply device according to claim 8, wherein the air ventilation means comprises:
first connecting members respectively connected to the air outlets of the casings provided at the lower portion of the housing;

air tubes respectively connected to the first connecting members;

a second connecting member connected to the air tubes to unify air flows respectively discharged from the air tubes; and

an air supply tube connected to the second connecting member to communicate the second connecting member and the interior of the shoe, and thus, to supply the air discharged from the second connecting member into the interior of the shoe.

【Claim 13】The air supply device according to claim 12, wherein each of the first connecting members has a cylindrical tube structure in which a central portion of the structure has a diameter smaller than opposite ends of the structure.

【Claim 14】The air supply device according to claim 12, wherein the second connecting member includes branched tubes forming one portion of the second connecting member to be connected with the air tubes, respectively, and a unified tube forming the other portion of the second connecting member to unify air flows respectively discharged from the air tubes and then to discharge the unified air into the air supply tube.

【Claim 15】The air supply device according to claim 14, wherein a cut-off valve is mounted in the second connecting member such that the cut-off valve is hingable about a hinge to selectively open one of the branched tubes while closing the other branched tube.

【Claim 16】The air supply device according to claim 15, wherein the hinging operation of the cut-off valve about the hinge is achieved by air discharged from one of the air tubes.

【Claim 17】The air supply device according to claim 15 or 16, wherein a stopper is provided at each branched tube to limit a hinging angle of the cut-off valve.
【Claim 18】The air supply device according to claim 1, wherein the frictional roller is interposed between adjacent ones of the wheels rotatably mounted to the bracket.

【Claim 19】An air supply device of a wheel-mounted shoe comprising:

- a fixed plate mounted to a lower surface of a top plate portion of a bracket fixed to an outer sole of the wheel-mounted shoe by fixing members, and provided with a pair of guide rods respectively mounted with springs;
- a moving plate elastically mounted to the fixed plate in a state of being fitted around the guide rods such that the moving plate is vertically movable, the moving plate being provided with a freely-rotatable hollow shaft mounted to a lower portion of the moving plate;
- a frictional roller fixedly mounted on the shaft such that the frictional roller is in close contact with a circumferential surface of at least one of wheels rotatably mounted to the bracket;
- air sucking means to suck ambient air in when the frictional roller rotates; and
- air ventilation means to supply the air sucked in by the air sucking means into the interior of the shoe through the shaft.

【Claim 20】The air supply device according to claim 19, wherein the air sucking means comprises a casing formed at a portion of a circumferential surface of the shaft positioned in a recess formed at the frictional roller, and provided with an air inlet.

【Claim 21】The air supply device according to claim 19, wherein the air sucking means comprises a casing formed at one end of the shaft, and provided with an air inlet.

【Claim 22】The air supply device according to claim 19, wherein the air ventilation means comprises:

- a through hole formed at the shaft to communicate with the air sucking means;
an air passage defined in the shaft to communicate with the air sucking
means via the through hole;

a box-shaped connector provided at one end of the shaft, and connected
with the air passage at one side wall of the connector; and

an elongated tube connected to a top wall of the connector while extending
to the interior of the shoe through the outer sole of the shoe to supply, into the
interior of the shoe, air introduced into the connector.

【Claim 23】The air supply device according to claim 22, wherein seal members
are fitted around an end of the shaft and an end of the elongated tube connected with
the connector, while being retained by support plates mounted to the connector,
respectively, to prevent leakage of air.

【Claim 24】The air supply device according to claim 23, wherein a cut-off valve is
mounted between the connector and the elongated tube to forcibly cut off flow of
air.
A. CLASSIFICATION OF SUBJECT MATTER

IPC7 A43B 7/06, A63C 17/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 A43B 7/06, A63C 17/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean Patents and Applications for Invention since 1975

Korean Utility models and Applications for Utility models since 1975

Electronic database consulted during the international search (name of data base and, where practicable, search terms used)

KIPASS, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.

See patent family annex.

Date of the actual completion of the international search


Date of mailing of the international search report


Name and mailing address of the ISA/KR

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Republic of Korea

Facsimile No. 82-42-472-7140

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BAHN, Yong Byung

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