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(57)

ABSTRACT(75) Inventor: **Tsutomu Hayakawa**, Shizuoka
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The present invention provides footwear capable of alleviating the effects of sweating feet. The footwear A includes: an outsole 1 including a chamber 1a having a recessed portion at a site to be located under a heel; an elastic member 4 for closing an upper surface of the chamber 1a having the recessed portion into an air-tight state, and including an expanded portion 4a expanding upward; an insole 2 having a covering portion 2a which is a recessed portion for covering the expanded portion of the elastic member 4, and having an opening 2b on its upper surface; an outside-air intake opening 1b provided on a side wall of the outsole 1; an outside-air passage 1c provided to the outsole 1 and establishing communication between the outside-air intake opening 1b and the chamber 1a; a first check valve G1 for incorporating outside air, provided inside the outside-air passage 1c to allow the air to flow toward the chamber 1a and to enter therein, whereas to block the flow of the air from the chamber 1a to the side of outside air; a discharge passage P for establishing communication between the chamber 1a and the opening 2b; and a second check valve G2 for exhausting the air, provided inside the discharge passage P to allow the air to flow out of the chamber 1a, whereas to block the flow of the air into the chamber 1a.

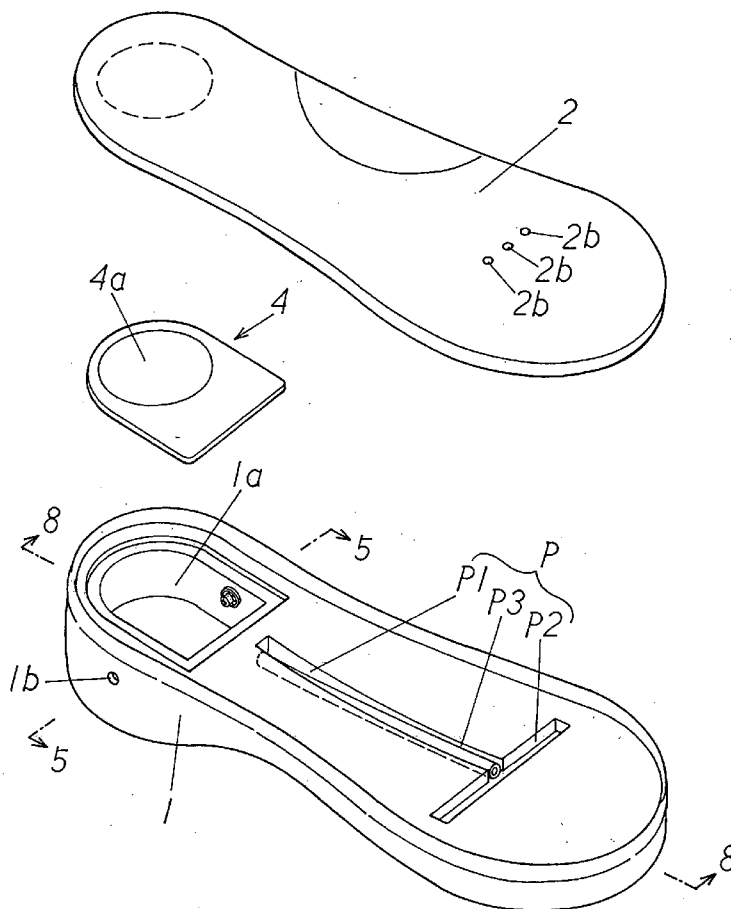


FIG. 1

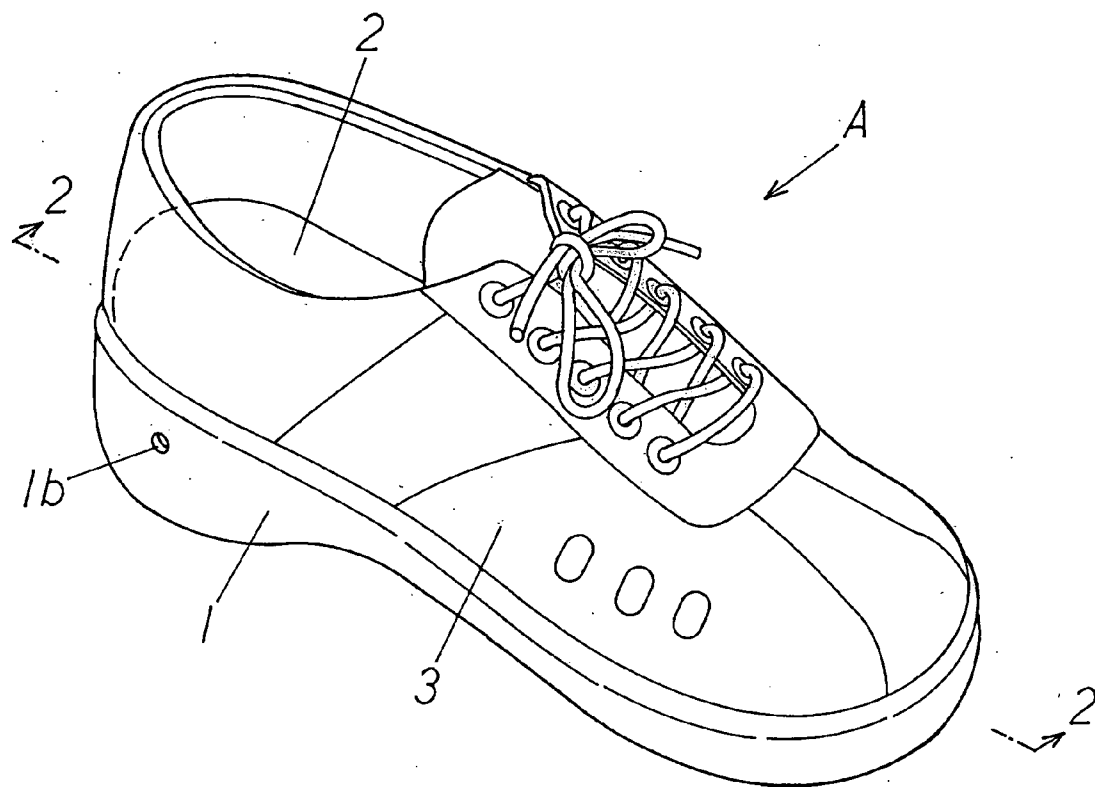


FIG. 2

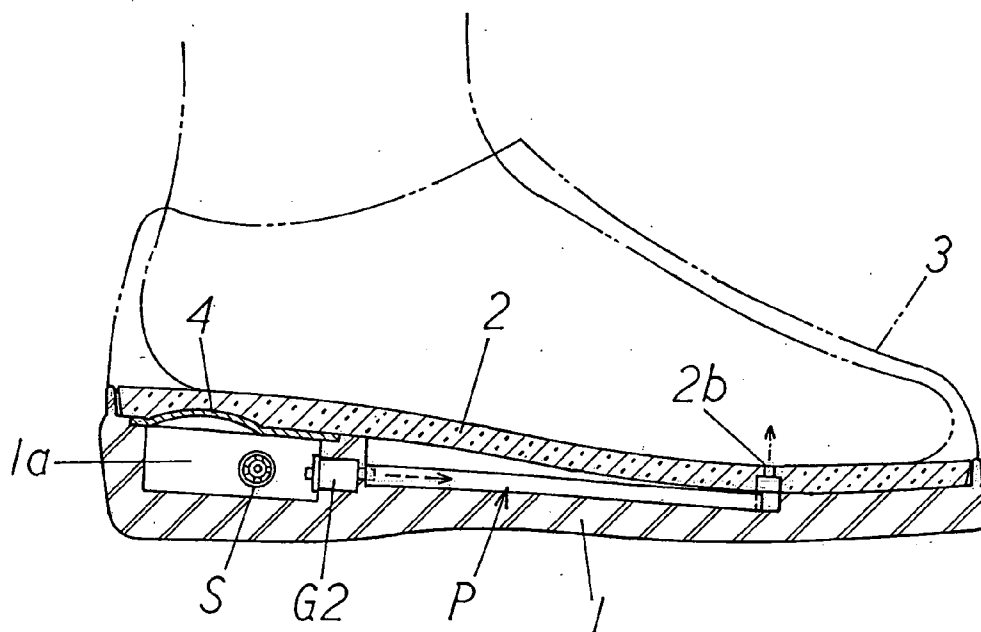


FIG. 3

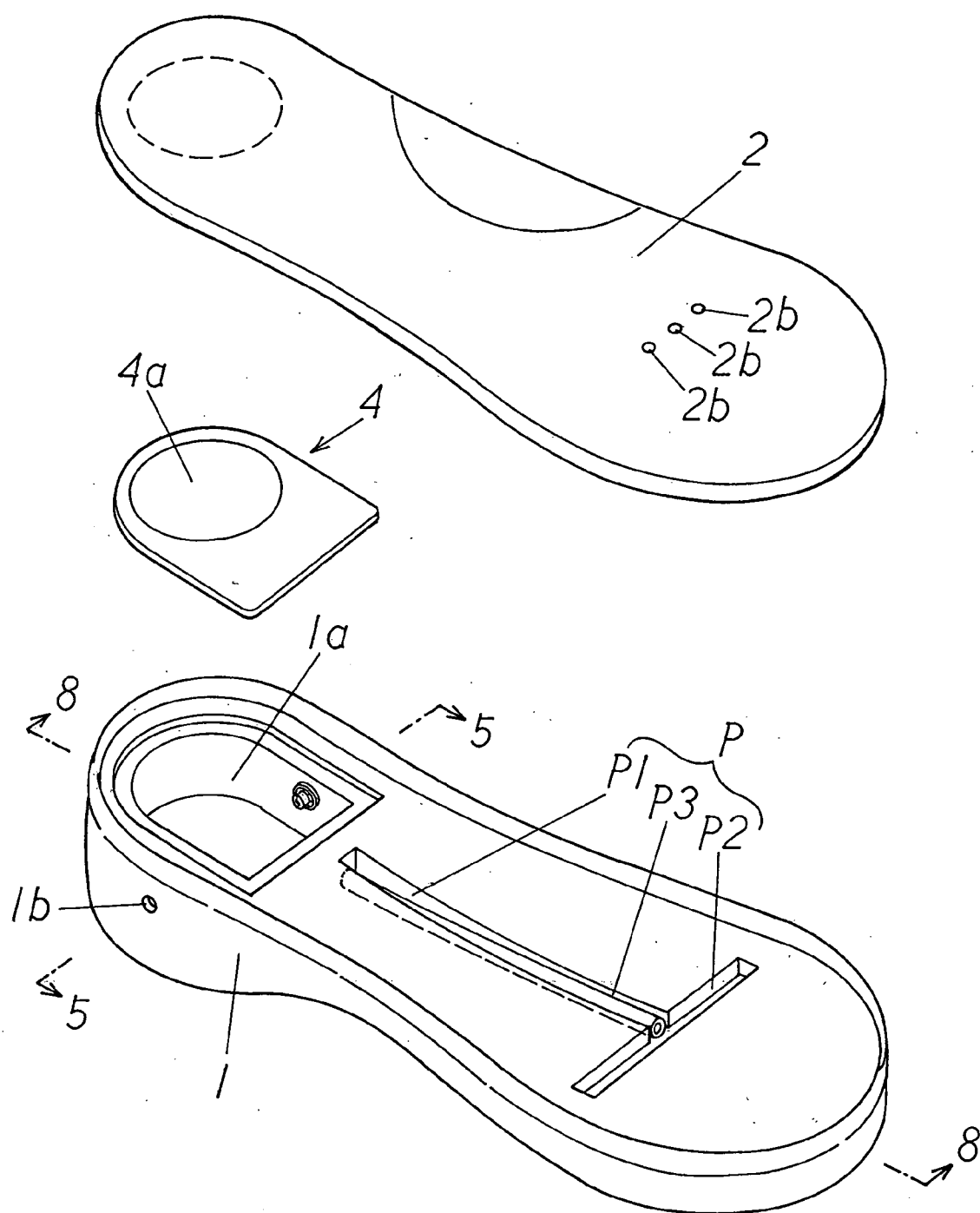


FIG. 4

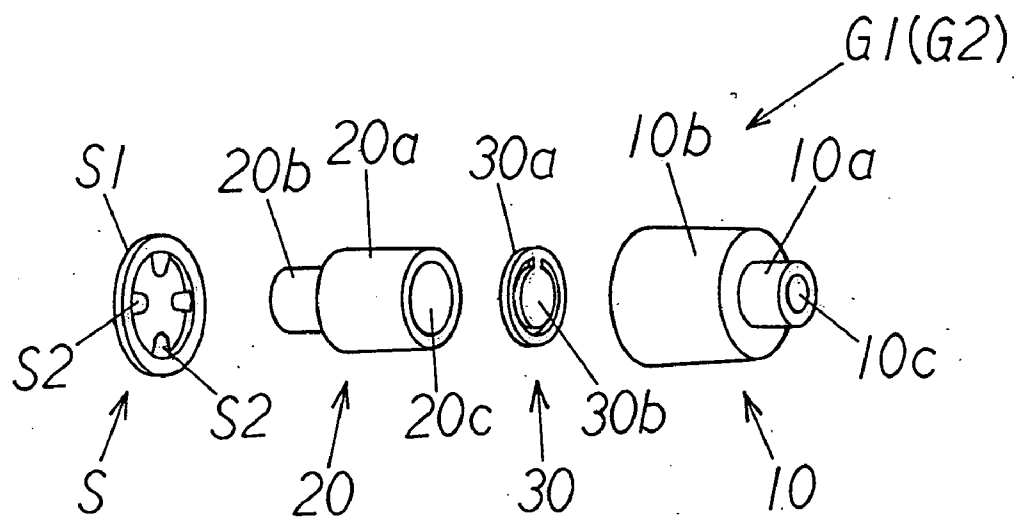


FIG. 5

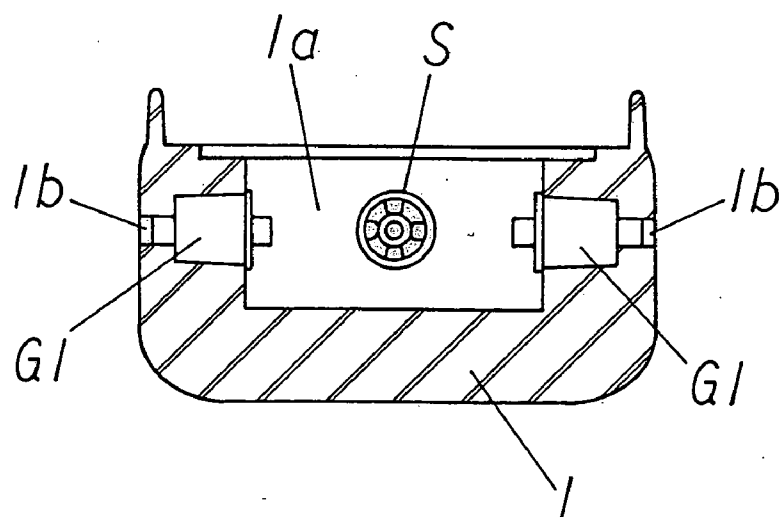


FIG. 6

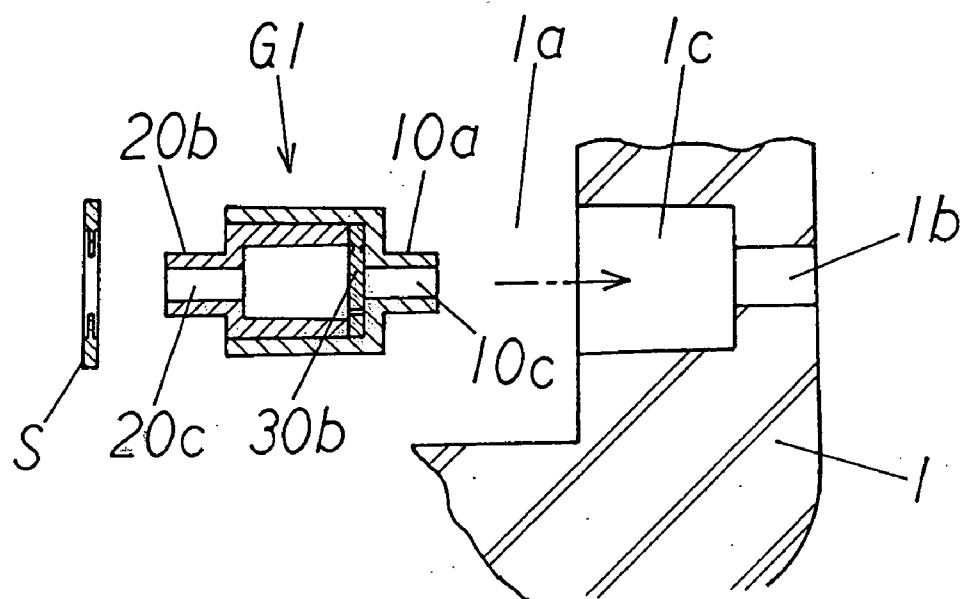


FIG. 7

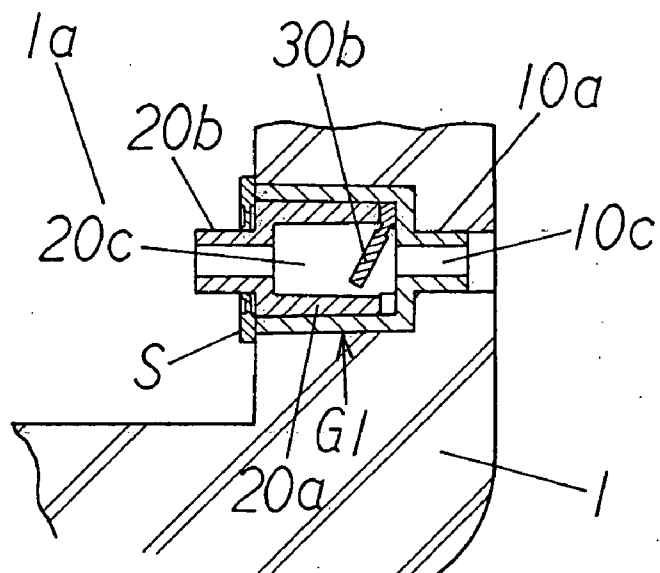


FIG.8

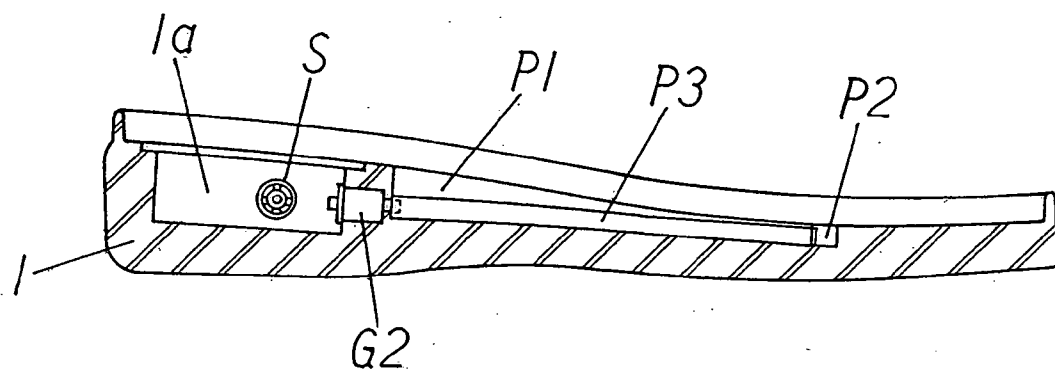


FIG.9

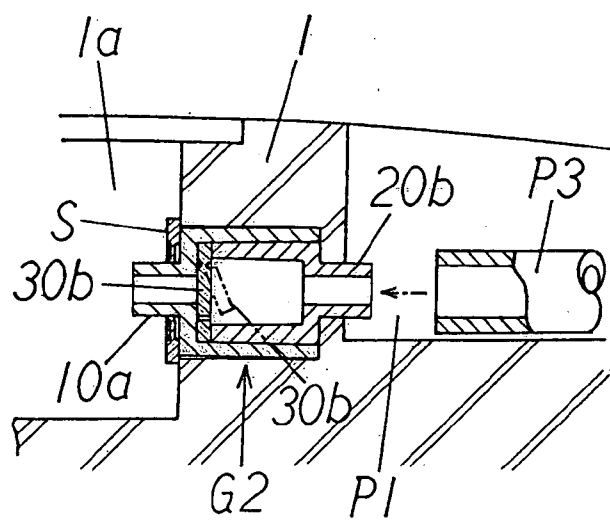


FIG. 10

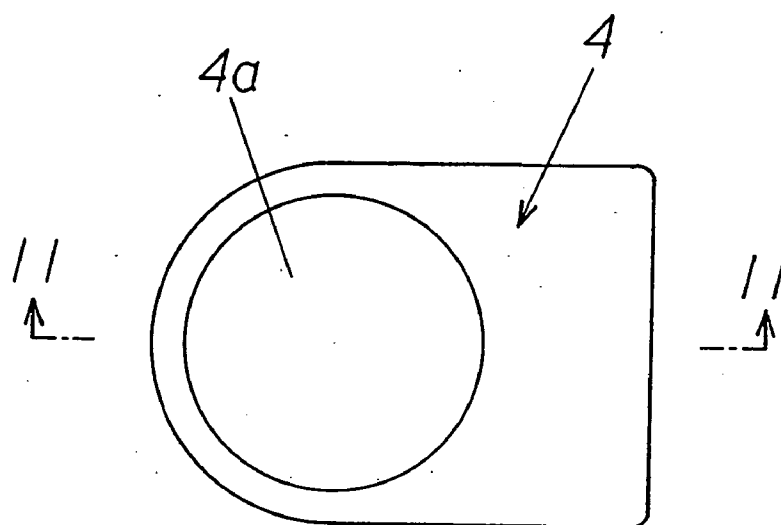


FIG. 11

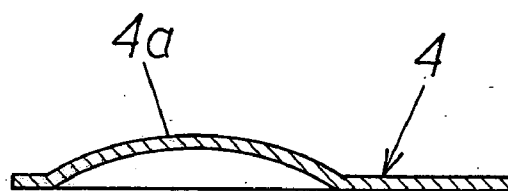


FIG. 12

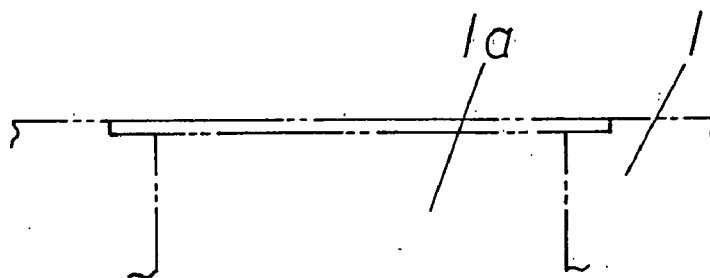


FIG. 13

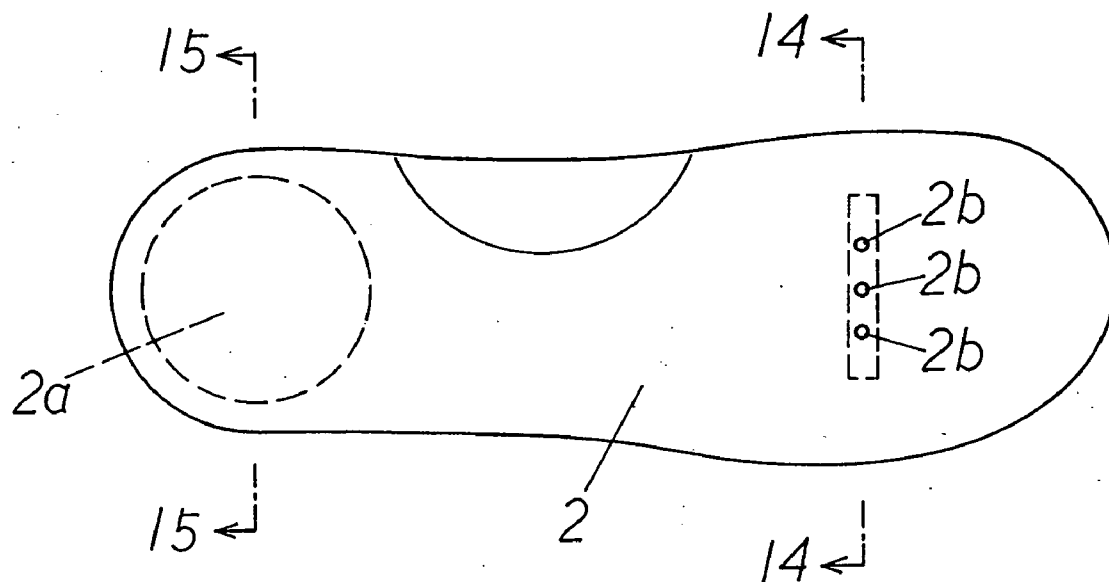


FIG. 14

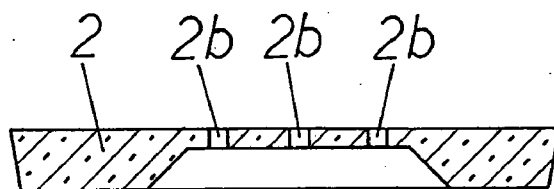


FIG. 15

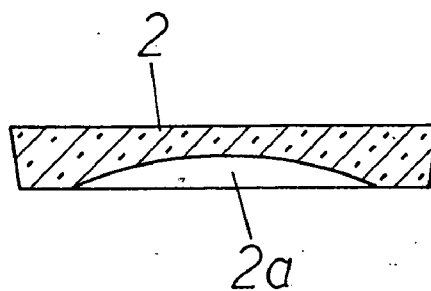


FIG. 16

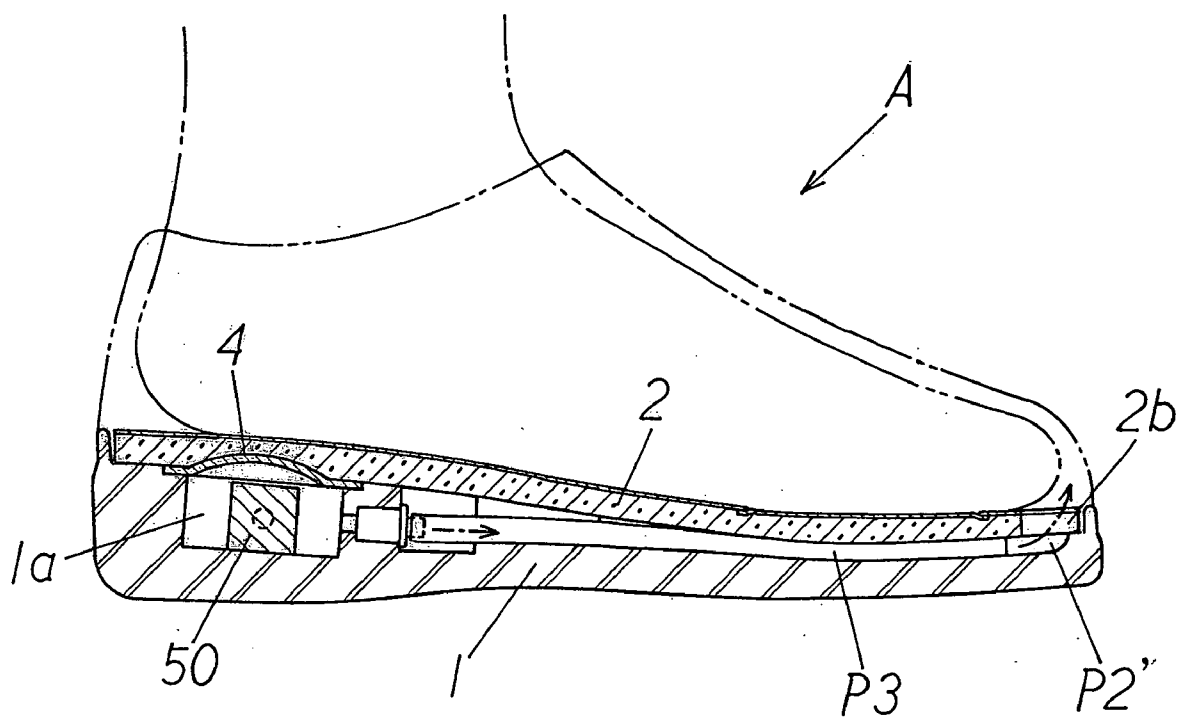


FIG.17

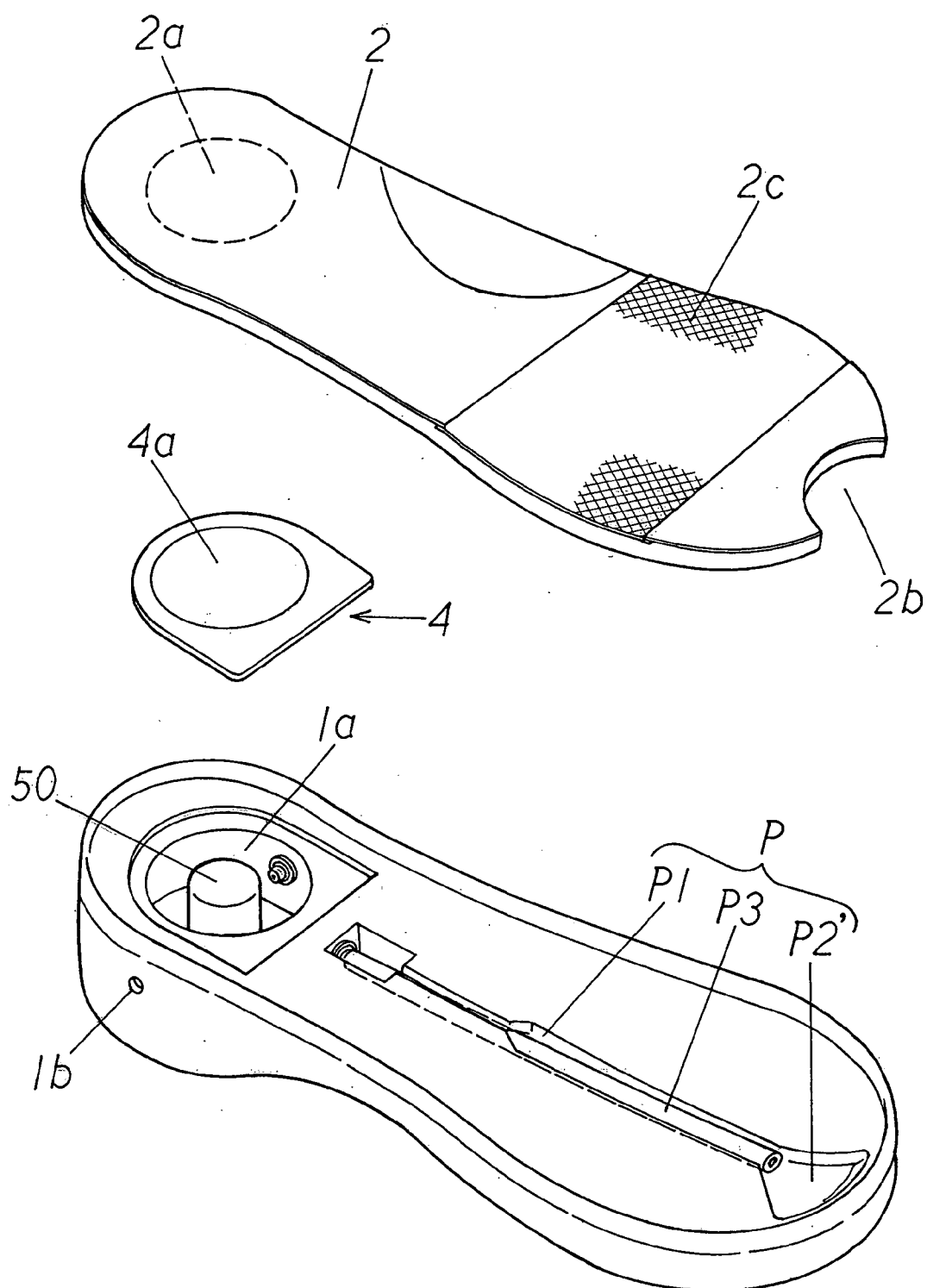


FIG. 18

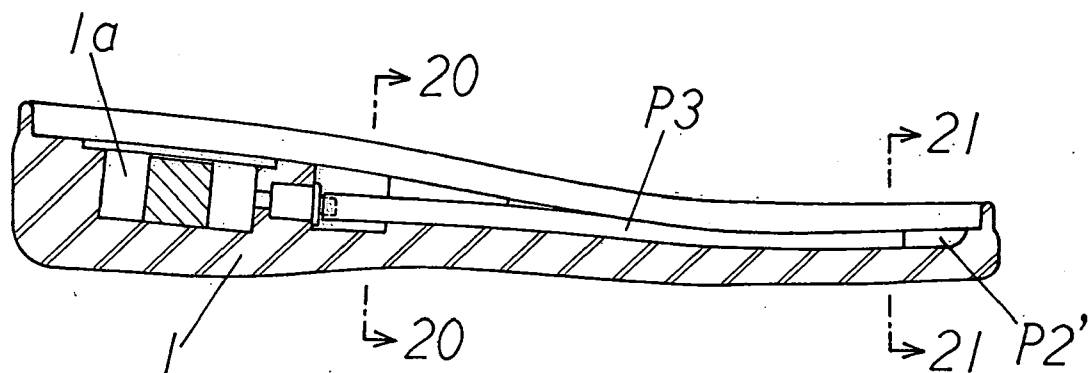


FIG. 19

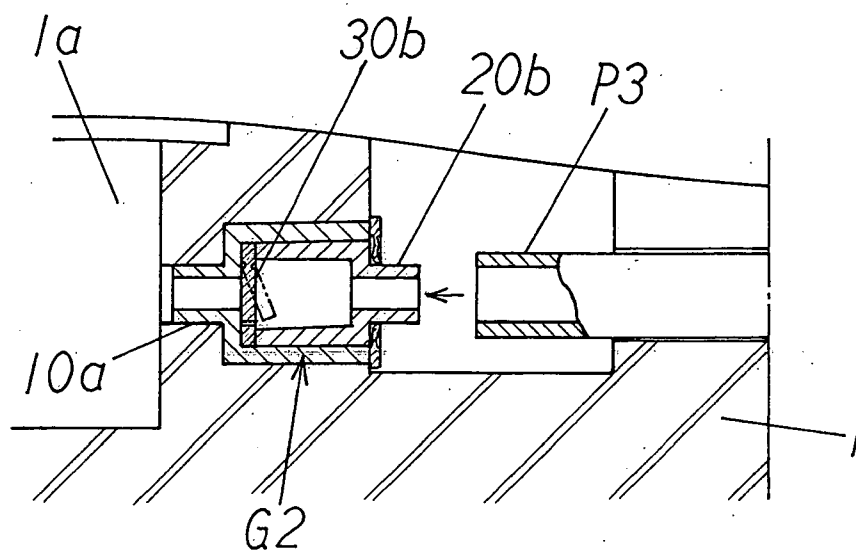


FIG. 20

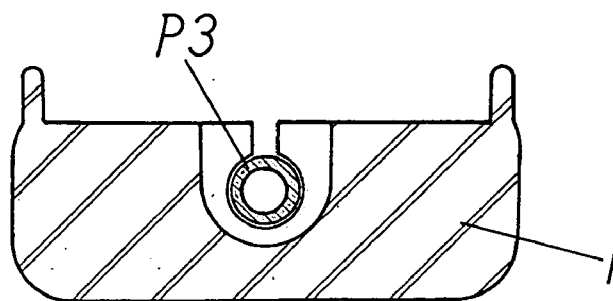


FIG. 21

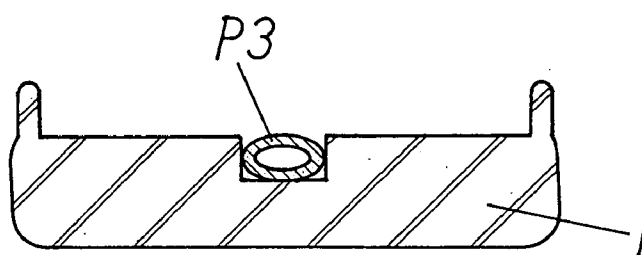
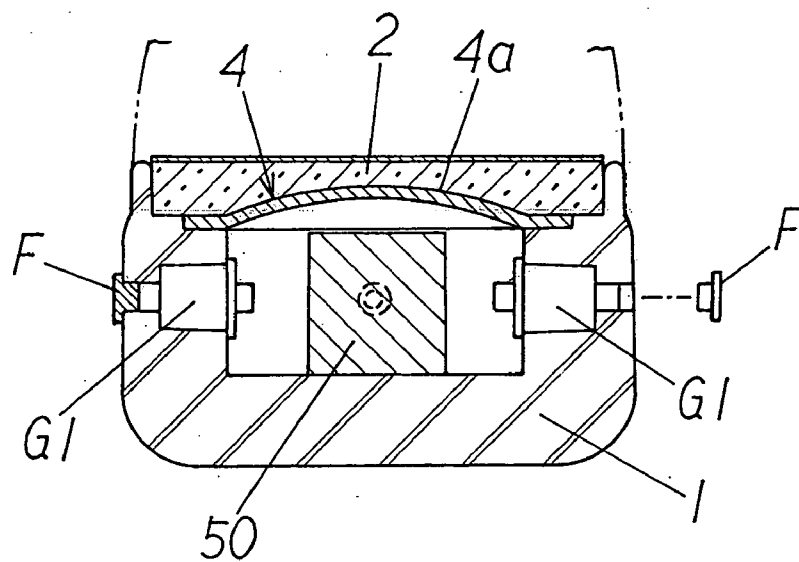


FIG. 22



FOOTWEAR

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates to footwear, and especially relates to footwear capable of alleviating the effects of sweating feet.

[0003] 2. Description of the Related Art

[0004] Conventionally, there has been footwear capable of alleviating the effects of sweating feet (for example, see Patent Document 1).

[0005] This is "footwear capable of ventilation during walking", wherein the volume inside a pump chamber is changed by utilizing the change in loads applied to a heel during walking so as to force the air out of the footwear to the outside.

[0006] However, the footwear described above has problems as follows. That is, since the expanded portion of the air-tight cover (elastic member) is exposed outside from the insole, the expanded portion of the air-tight cover (elastic member) is easy to wear out from use. Further, a clearance is formed between the insole and the surrounding of the expanded portion of the air-tight cover (elastic member), and dusts and the like easily come into the clearance. Further, since the expanded portion of the air-tight cover (elastic member) is projected from the insole, the appearance is not good.

[0007] [Patent Document 1] Japanese Patent No. 2918836 (FIGS. 1 and 2)

SUMMARY OF THE INVENTION

[0008] An objective of the present invention is to provide footwear which has overcome the problems described above.

EFFECT OF THE INVENTION

[0009] According to the footwear recited in claim 1, since the elastic member has an expanded portion expanding upward, a large amount of deformation is created to increase the pumping action by incorporating and exhausting air into and from the chamber. Further, the expanded portion of the elastic member does not project beyond the insole unlike the conventional footwear, and the insole has a covering portion which is a recessed portion covering the expanded portion of the elastic member. Due to this structure, the expanded portion of the elastic member can be protected. In addition, since the expanded portion never projects beyond the insole unlike the conventional footwear, the appearance is not degraded.

[0010] Further, according to the footwear recited in claim 2, in addition to the effect of the invention recited in claim 1 described above, unlike the conventional check valve in which the pipe is closed at the closed middle portion, and a slit and an opening are provided on one side of the closed middle portion whereas another slit and another opening are provided on the other side thereof with the closed middle portion interposed therebetween, one and the same check valve can alone serve as a first check valve for incorporating outside air and also as a second check valve for exhausting air by changing the orientation of the check valve.

[0011] Further, according to the footwear recited in claim 3, in addition to the effect of the invention recited in claim 2 described above, one end of the pipe accommodated in the

guide groove is inserted so as to be in contact with the outer wall of the second cylinder of the second check valve for exhausting air, whereas the other end of the pipe is structured so as to face the branched groove branched from the guide groove into the left and right sides. Thus, outside air can be introduced in an air-tight state.

[0012] If the outside-air intake opening is always open, when rain falls, the rain will enter the footwear via the outside-air intake opening. According to the footwear recited in claim 4, in addition to the effect of the invention recited in claim 1 described above, by covering the outside-air intake opening with the cover, entry of rain into the footwear can be prevented.

[0013] When the site of the heel is put onto the elastic member, the elastic member will be depressed into the chamber having the recessed portion, and this causes uncomfortable feeling during walking. However, according to the footwear recited in claim 5, in addition to the effect of the invention recited in claim 1 described above, even if the site of the heel is put onto the elastic member, the supporting member receives the elastic member as it descends, and reduces the descending amount of the elastic member. As a result, the uncomfortable feeling during walking can be reduced.

[0014] Further, according to the footwear recited in claim 6, in addition to the effect of the invention recited in claim 2 described above, the other end of the pipe faces the enlarged groove, and said enlarged groove faces the opening of the insole. Further, the opening of the insole is enlarged toward the top end located at the toe side. Thus, the resistance to the air supplied from the pipe is reduced, and sufficient outside air can be introduced into the footwear.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] FIG. 1 is a schematic perspective view of footwear according to an embodiment of the present invention;

[0016] FIG. 2 is a schematic cross-sectional view in an exploded state taken along the line 2-2 in FIG. 1;

[0017] FIG. 3 is a schematic exploded perspective view showing the footwear of FIG. 1 with its upper removed;

[0018] FIG. 4 is a schematic exploded perspective view of a first check valve for incorporating outside air (or a second check valve for exhausting air) mounted to the footwear of FIG. 1;

[0019] FIG. 5 is a schematic cross-sectional view taken along the line 5-5 of FIG. 3;

[0020] FIG. 6 is a schematic cross-sectional view before the first check valve for incorporating outside air of FIG. 5 is mounted;

[0021] FIG. 7 is a schematic cross-sectional view for illustrating the function of the first check valve for incorporating outside air of FIG. 5;

[0022] FIG. 8 is a schematic cross-sectional view taken along the line 8-8 of FIG. 3;

[0023] FIG. 9 is a schematic cross-sectional view before the pipe is mounted to the second check valve for exhausting air of FIG. 8;

[0024] FIG. 10 is a schematic plan view of the elastic member of FIG. 3;

[0025] FIG. 11 is a schematic cross-sectional view taken along the line 11-11 of FIG. 10;

[0026] FIG. 12 is a schematic cross-sectional view in a state where the elastic member of FIG. 11 closes the recessed portion of the outsole in an air-tight state;

[0027] FIG. 13 is a schematic plan view of the insole of FIG. 3;

[0028] FIG. 14 is a schematic cross-sectional view taken along the line 14-14 of FIG. 13;

[0029] FIG. 15 is a schematic cross-sectional view taken along the line 15-15 of FIG. 13;

[0030] FIG. 16 is a schematic cross-sectional view of footwear different from the footwear of FIG. 2 according to another embodiment;

[0031] FIG. 17 is a schematic exploded perspective view showing the footwear of FIG. 16 in an exploded state;

[0032] FIG. 18 is a schematic cross-sectional view of the outsole of FIG. 17;

[0033] FIG. 19 is a schematic partially enlarged cross-sectional view showing a part of FIG. 18 in an enlarged state;

[0034] FIG. 20 is a schematic cross-sectional view taken along the line 20-20 of FIG. 16;

[0035] FIG. 21 is a schematic cross-sectional view taken along the line 21-21 of FIG. 16; and

[0036] FIG. 22 is a schematic cross-sectional view of FIG. 16.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

[0037] Footwear according to an embodiment of the present invention will be described referring to the drawings.

[0038] In FIGS. 1 to 15, the reference numeral A denotes footwear. The footwear A schematically includes an outsole 1, an insole 2, and an upper 3.

[0039] The outsole 1 is made of polyurethane for example, and includes a chamber 1a having a recessed portion at the site to be located under the heel. The reference numeral 4 shown in FIG. 3 denotes an elastic member. The elastic member 4 is, for example, made of vinyl chloride, and includes an expanded portion 4a for closing in an air-tight state the upper surface of the chamber 1a having the recessed portion (for example, the recessed portion of the chamber 1a is covered with the elastic member 4, and the elastic member 4 is adhered to the upper surface of the chamber 1a by an adhesive agent), and at the same time, has an expanded portion 4a which expands upward. Further, as shown in FIGS. 13 to 15, the insole 2 includes a covering portion 2a which is a recessed portion for covering the expanded portion 4a of the elastic member 4, and at the same time, includes a plurality of openings 2b over the upper surface.

[0040] The reference numeral 1b shown in FIG. 1 denotes an outside-air intake opening provided on the side wall of the outsole. The outside-air intake opening 1b is also provided on the back surface side of the illustrated outside-air intake opening 1b shown in FIG. 1.

[0041] Further, the reference numeral 1c shown in FIG. 6 denotes an outside-air passage provided to the outsole 1 and establishing the communication between the outside-air intake opening 1b and the chamber 1a.

[0042] Inside the outside-air passage 1c, a first check valve G1 for incorporating outside air is provided. The first check valve G1 for incorporating outside air operates to allow the air to flow toward the chamber 1a and to be

introduced therein, whereas to prevent the flow of the air from the chamber 1a toward the side of outside air (see FIG. 7).

[0043] The first check valve G1 for incorporating outside air is press-fit into the outside air passage 1c, and is disposed at a position where the end surface of a later-described second' cylinder 20b of the first check valve G1 for incorporating outside air faces the chamber 1a.

[0044] Specifically, as shown in FIG. 4, the check valve of the first check valve G1 includes a first cylinder body 10, a second cylinder body 20 to be inserted into the first cylinder body 10, and a valve 30 interposed between the second cylinder body 20 and the first cylinder body 10.

[0045] The first cylinder body 10 includes a first cylinder 10a, a second cylinder 10b connected to the first cylinder 10a and having an inner diameter larger than the inner diameter of the first cylinder 10a, and a first passage 10c for establishing communication between the second cylinder 10b and the first cylinder 10a. For example, the first cylinder 10a and the second cylinder 10b are integrally formed into a one-piece unit by plastic.

[0046] Further, the second cylinder body 20 includes a first' cylinder 20a having an outer diameter smaller than the inner diameter of the second cylinder 10b in such a manner as to be in contact with the inner wall of the second cylinder 10b, a second' cylinder 20b connected to the first' cylinder 20a and having an outer diameter smaller than the outer diameter of the first' cylinder 20a, and a second passage 20c for establishing communication between the second' cylinder 20b and the first cylinder 20a'. For example, the first' cylinder 20a and the second' cylinder 20b are integrally formed into a one-piece unit by plastic.

[0047] Further, the valve 30 includes a ring portion 30a, and a cover 30b supported by the ring portion 30a and having a size larger than the inner diameter of the first cylinder 10a and smaller than the inner diameter of the ring portion 30a and the inner diameter of the first' cylinder 20a.

[0048] Further, the reference numeral S shown in FIG. 4 denotes a stopper. The stopper S includes a ring portion S1, and a plurality of claws S2 projecting inward of the ring portion S1. The ring portion S1 serves as a stopper at the time when the first check valve G1 or the second check valve G2 are attached in a state of facing the chamber 1a. Further, the claws S2 are to engage with the outer peripheral surface of the second' cylinder 20b or the second cylinder 10b.

[0049] Therefore, as shown in FIG. 7, when air flows from the first passage 10c toward the second passage 20c into the cover 30b, the cover 30b moves into the first' cylinder 20a, and at the same time, air is introduced into the second passage 20c. Contrarily, when air flows from the second passage 20c toward the first passage 10c into the cover 30b, the cover 30b operates to close the first passage 10c of the first cylinder 1a.

[0050] Further, the reference numeral P shown in FIG. 2 denotes a discharge passage for establishing communication between the chamber 1a and the opening 2b. Inside the discharge passage P, a second check valve G2 for exhausting air is provided. The second check valve G2 for exhausting air serves to allow the air to flow toward the direction to be discharged from the chamber 1a, whereas to prevent the air from flowing into the chamber 1a (see FIG. 9). The second check valve G2 for exhausting air is structurally the same as the first check valve G1 for incorporating outside air, except

for the orientation and the site to be in contact with the stopper S, and therefore, its description will be omitted.

[0051] Specifically, as shown in FIG. 7, the first check valve G1 for incorporating outside air has a structure in which the first cylinder 10a of the check valve is located at the side of outside air, and the second' cylinder 20b is located at the side of the chamber 1a, and the claws S2 of the stopper S are engaged with the outer peripheral surface of the second' cylinder 20b. Contrarily, as shown in FIG. 9, the second check valve G2 for exhausting air has a structure in which the first cylinder body 10a of the check valve is located at the side of the chamber 1a, and the claws S2 of the stopper S are engaged with the outer peripheral surface of the first cylinder body 10a.

[0052] Further, as shown in FIGS. 3 and 9, the discharge passage P described above is provided to the outsole 1 and communicates with the chamber 1a. The discharge passage P includes a linear guide groove P1 extending toward the toe, a branched groove P2 provided to the outsole 1 and branched from the linear guide groove P1 into left and right sides and communicating with the opening 2b, and a pipe P3 accommodated in the guide groove P1. One end of the pipe P3 is inserted so as to be in contact with the outer wall of the second' cylinder 20b of the second check valve G2 for exhausting air, whereas the end surface of the first cylinder 10a of the second check valve G2 for exhausting air faces the chamber 1a. The other end of the pipe P3 is structured to face the branched groove P2 (see FIG. 8).

[0053] Therefore, according to the footwear A described above, since the elastic member 4 has an expanded portion 4a expanding upward, a large amount of deformation is created to increase the pumping action by incorporating and exhausting air into and from the chamber 1a. Specifically, when the weight is applied to a heel, the expanded portion 4a of the elastic member 4 enters the chamber 1a to release air from the chamber 1a via the discharge passage P and the opening 2b, thereby alleviating the effects of sweating feet. When the application of the weight to the heel is stopped, the elastic member 4 elastically deforms to incorporate air into the chamber 1a via the outside-air passage 1c.

[0054] Further, the expanded portion 4a of the elastic member 4 does not project beyond the insole 2 unlike the conventional footwear, and the insole 2 has a covering portion 2a which is a recessed portion covering the expanded portion 4a of the elastic member 4. Due to this structure, the expanded portion 4a of the elastic member 4 can be protected. In addition, since the expanded portion 4a never projects beyond the insole 2 unlike the conventional footwear, the appearance is not degraded.

[0055] Further, unlike the conventional check valve (see Patent Document 1) in which the pipe is closed at the closed middle portion, and a slit and an opening are provided on one side of the closed middle portion whereas another slit and another opening are provided on the other side thereof with the closed middle portion interposed therebetween, the first check valve G1 for incorporating outside air (or the second check valve G2 for exhausting air) can alone serve as a first check valve G1 for incorporating outside air and also as a second check valve G2 for exhausting air by changing the orientation of the check valve.

[0056] Further, the first check valve G1 for incorporating outside air and the second check valve G2 for exhausting the air may be respectively attached in such a manner that the end surface of the second' cylinder 20b of the first check

valve G1 for incorporating outside air faces the chamber 1a, and that the end surface of the first cylinder 10a of the second check valve G2 for exhausting air faces the chamber 1a. Thus, the check valves can be easily mounted. Further, one end of the pipe P3 is inserted so as to be in contact with the outer wall of the second' cylinder 20b of the second check valve G2 for exhausting air, whereas the other end of the pipe P3 is structured so as to face the branched groove P2. Due to this structure, the introduction of outside air can be easily achieved and the pipe P3 can be kept in an air-tight state.

[0057] In the embodiment described above, the discharge passage P includes the linear guide groove P1, the branched groove P2, and the pipe P3 accommodated in the guide groove P1. However, the present invention is not limited thereto. Alternatively, for example, as shown in FIGS. 16 to 22, the discharge passage P may include a linear guide groove P1 provided to the outsole 1 and communicating with the chamber 1a and extending toward the toe, an enlarged groove P2' provided to the outsole 1 and expanding from the top end of the linear guide groove P1, and a pipe P3 accommodated in the guide groove P1. In this structure, the one end of the pipe P3 is inserted so as to be in contact with the outer wall of the second' cylinder 20b of the second check valve G2 for exhausting air. The end surface of the first cylinder 10a of the second check valve G2 for exhausting air faces the chamber 1a. The other end of the pipe P3 faces the enlarged groove P2'.

[0058] According to the footwear of this embodiment, the other end of the pipe P3 faces the enlarged groove P2' whereas said enlarged groove P2' faces the opening 2b of the insole 2. Further, the opening 2b of the insole 2 enlarges toward the top end located at the toe side. Thus, the resistance to the air supplied from the pipe P3 is reduced, and sufficient outside air can be introduced into the footwear A.

[0059] Further, the reference numeral 2C shown in FIG. 17 denotes a deodorant member made of cloth having a deodorant function. The portion of the pipe P3 near the toe is in a flat shape as shown in FIGS. 20 and 21. In the embodiment shown in FIGS. 16 to 22, the constituent elements identical to those of the foregoing embodiment are denoted by the same reference numerals and their description is partially omitted.

[0060] Further, the reference numeral F shown in FIG. 22 denotes a cover detachably attached to the outside-air intake opening 1b. If the outside-air intake opening 1b is always open, when rain falls, the rain will enter the footwear A via the outside-air intake opening 1b. By covering the outside-air intake opening 1b with the cover F, entry of rain into the footwear A can be prevented.

[0061] Further, the reference numeral 50 shown in FIG. 17 denotes a supporting member having elastic force. The supporting member is located within the chamber 1a having a recessed portion under the elastic member 4, for supporting the elastic member 4 when it is depressed. Without the supporting member 50, when the site of a heel is put onto the elastic member 4, the elastic member 4 is depressed into the chamber 1a having a recessed portion, and this causes uncomfortable feeling during walking. Contrarily, according to the footwear A of this embodiment formed with the supporting member 50, when the site of a heel is put onto the elastic member 4, the supporting member 50 receives the elastic member 4 as it descends and reduces the descending

amount of the elastic member 4. As a result, the uncomfortable feeling during walking can be reduced.

What is claimed is:

1. Footwear comprising:

an outsole including a chamber having a recessed portion at a site to be located under a heel;

an elastic member for closing an upper surface of said chamber having said recessed portion into an air-tight state, and including an expanded portion expanding upward;

an insole having a covering portion which is a recessed portion for covering the expanded portion of the elastic member, and having an opening on its upper surface;

an outside-air intake opening provided on a side wall of said outsole;

an outside-air passage provided to said outsole and establishing communication between said outside-air intake opening and said chamber;

a first check valve for incorporating outside air, provided inside the outside-air passage to allow the air to flow toward said chamber and to enter therein, whereas to block the flow of the air from said chamber to the side of outside air;

a discharge passage for establishing communication between said chamber and said opening; and

a second check valve for exhausting air, provided inside the discharge passage to allow the air to flow out of said chamber, whereas to block the flow of the air into said chamber.

2. Footwear according to claim 1,

wherein said check valve includes a first cylinder body, a second cylinder body to be inserted into said first cylinder body, and a valve interposed between said second cylinder body and said first cylinder body,

wherein said first cylinder body includes a first cylinder, a second cylinder connected to said first cylinder and having an inner diameter larger than an inner diameter of said first cylinder, and a first passage for establishing communication between said second cylinder and said first cylinder,

wherein said second cylinder body includes a first' cylinder having an outer diameter smaller than an inner diameter of said cylinder body so that said first' cylinder is in contact with an inner wall of said second cylinder, a second' cylinder connected to said first' cylinder and having an outer diameter smaller than an outer diameter of said first' cylinder, and a second passage for establishing communication between said second' cylinder and said first' cylinder,

wherein said valve includes a ring portion, and a cover supported by said ring portion and having a size larger than the inner diameter of said first cylinder and smaller than the inner diameter of said ring portion and inner diameter of said first' cylinder,

wherein, when air flows to said cover from said first passage toward said second passage, said cover moves into said first' cylinder, and said air is introduced into said second passage,

wherein, when air flows to said cover from said second passage toward said first passage, said cover closes said first passage of said first cylinder,

wherein said first check valve for incorporating outside air moves said first cylinder body of said check valve to the side of outside air whereas said second' cylinder body to the side of the chamber, and

wherein said second check valve for exhausting air moves said first cylinder body of said check valve to the side of said chamber.

3. Footwear according to claim 2,

wherein said outsole is made of polyurethane,

wherein said first check valve for incorporating outside air is press-fit into the outside-air passage, and the end surface of the second' cylinder of said first check valve for incorporating outside air faces said chamber,

wherein said insole includes a plurality of openings, wherein said discharge passage for establishing communication between said chamber and said openings include:

a linear guide groove provided to said outsole and communicating with said chamber and extending toward a toe;

a branched groove provided to said outsole, branched from said linear guide groove into left and right sides, and communicating with said openings; and

a pipe accommodated in said guide groove, wherein one end of said pipe is inserted so as to be in contact with the outer wall of the second' cylinder of the second check valve for exhausting air, the end surface of the first cylinder of the second check valve for exhausting air faces said chamber, and the other end of said pipe faces said branched groove.

4. Footwear according to claim 1, wherein a detachable cover is provided to the outside-air intake opening.

5. Footwear according to claim 1, further comprising a supporting member having an elastic force, located below the elastic member and within the chamber having a recessed portion, and supporting the elastic member as it moves down.

6. Footwear according to claim 2, wherein said discharge passage comprises:

a linear guide groove provided to the outsole, communicating with the chamber, and extending toward the toe; an enlarged groove provided to the outsole and enlarged from the top end of said linear guide groove; and

a pipe accommodated in said guide groove, wherein one end of said pipe is inserted so as to be in contact with the outer wall of the second' cylinder of the second check valve for exhausting air, the end surface of the first cylinder of the second check valve for exhausting air faces said chamber, and the other end of said pipe faces said enlarged groove, and

wherein the opening of the insole faces said enlarged groove and the opening of said insole enlarges toward the top end located at the toe side.

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