FOOTWEAR WITH ENHANCED TEMPERATURE CONTROL

A shoe (14), particularly an athletic shoe, in which a multilayer assembly (12) is disposed between the midsole (10) and the insole of the shoe, with the multilayer assembly (12) inhibiting the transfer of heat by virtue of a heat resistant layer or film (12b) disposed within the multilayer assembly (12). The multilayer assembly (12) preferably includes a metalized Mylar (polyethylene terephthalate) film (12b) which is sandwiched between two layers (12a and 12c) of strobel material. This arrangement provides an effective and durable design which inhibits the transfer of heat from hot surfaces to the foot. In accordance with a further aspect, an advantageous ventilation system is provided in the insole, with the ventilation system particularly effective since it is shielded from heat utilizing the multilayer assembly (12).
FOOTWEAR WITH ENHANCED TEMPERATURE CONTROL

Field of the Invention

The invention relates to footwear, and particularly to athletic footwear having features which provide improved comfort to the wearer, particularly from a standpoint of modulating or controlling the temperature of the foot. The invention is primarily directed to a shoe having features to keep the foot cool and dry. Certain aspects of the invention could also be utilized in footwear designed to keep the foot warm.

BACKGROUND OF THE INVENTION

Discussion of Background

The footwear industry, particularly the athletic footwear industry, has seen numerous design features introduced in order to enhance the comfort and/or performance of the wearer. Often such modifications relate to enhancing the manner in which the shoe supports the foot, such that the shoe can, for example, better absorb impacts or allow the wearer to more comfortably exert a large amount of force while reducing the possibility of injury. These designs modifications demonstrate, that comfort and performance are often interdependent. An athlete who can rely upon his or her footwear to perform without injury or discomfort can better train and perform up to their potential.

One aspect of footwear design which often receives less attention relates to foot temperature and the ability of the footwear to prevent excessive heat or, in some instances, to retain heat. For many athletic activities, such as running or tennis, the wearer must perform in hot temperatures and upon surfaces (e.g., asphalt) which can be even hotter than the ambient temperature. In these conditions, it is important for the shoe to keep the foot as cool and dry as possible. Similarly, if the athlete is to perform in cold conditions, the footwear should be able to retain heat to optimize the wearer’s performance and prevent injury.

Whether the athlete is an occasional athlete or a professional, the ability of the footwear to modulate temperature can have both comfort and performance effects. Obviously, whenever there is foot discomfort, the physical activity is less enjoyable. In addition, such discomfort can psychologically and physiologically detract from the
performance of the wearer. Generally, with athletic footwear utilized, e.g., in running or tennis, it is desirable to prevent overheating of the foot. Excessive foot temperature can lead to excessive perspiration and premature fatigue (mentally and physically). Further, excessive perspiration can also detract from the wearer's ability to react quickly, take a quick step, or change directions, since the foot is held less firmly within the shoe.

Under certain conditions, it can also be desirable to retain heat, e.g., where the athletic activity is to be performed in a cold climate. The retention of heat can be important in providing comfort to the wearer, preventing injury or frostbite, and providing better circulation. Obviously, temperature modulation is very important in enhancing the wearer’s comfort and performance.

A number of footwear designs have attempted to provide desirable temperature modulation. For example, U.S. Patent No. 4,055,699 to Hsiung discloses the use of a four layer insole to enhance the insulating characteristics of the shoe, with the bottom layer formed of aluminized Mylar. However, the Hsiung arrangement is suitable for cold climates, but does not assist in modulating foot temperature in hot conditions. Moreover, the use of Mylar at the bottom of the insole can be problematic in that the Mylar can deteriorate or degrade with use. Further, if the Mylar is utilized in hot conditions as a bottom layer, there is an increased possibility of degradation and/or delamination of the Mylar.

Particularly from a standpoint of preventing excessive heating of the foot, the primary difficulty resides in the ability to modulate heat at the underside of the foot. However, it can be difficult to incorporate successful temperature modulating features without detracting from cushioning and support functions - which are often been the primary focus of athletic shoe designs in the region beneath the foot. Thus, it can be difficult to provide a design which will not interfere with the cushioning/support functions of the shoe while also providing a durable design which can keep the foot cool and dry.

**SUMMARY OF THE INVENTION**

It is an object of the invention to provide a shoe having enhanced capabilities in controlling or modulating the temperature of the wearer's foot. Although the primary focus of the invention resides in the ability to prevent overheating of the foot, and to keep the foot
cool and dry, certain aspects of the invention could also be advantageously utilized in retaining heat within the shoe. In a particularly preferred form of the invention a multilayer assembly, comprised of a heat resistant film disposed between two layers of strobel material, is disposed between the midsole and the insole of the shoe. The heat resistant film can be, for example, a metalized Mylar film. Such a film has a reflective surface and a non-reflective surface. Where it is desired to prevent overheating of the foot, the reflective surface of the film faces toward the midsole and acts as a barrier to reduce or inhibit the transfer of heat from hot surfaces (such as asphalt) to the foot. If desired, this arrangement could also be utilized in footwear designed to retain foot heat, in which case the reflective surface of the film would be disposed to face toward the insole. As noted above, the primary focus of the invention is upon footwear designs which can reduce overheating of the foot, to thereby keep the foot cool and dry.

With the heat resistant film disposed in the strobel material, the durability of the film is enhanced, since there is little risk of delamination, and the Mylar film is protected by the surrounding strobel material. Further, the positioning of the multilayer strobel and Mylar film layer beneath the insole is additionally advantageous in accordance with the invention, since a ventilation system is incorporated in the insole design. Thus, the multilayer strobel/Mylar assembly not only reduces the heat transfer from a hot surface to the foot, but also, the performance of the ventilation system is enhanced since the air in the ventilation system is also protected from the heat of the hot surface. Other advantageous aspects of the invention are disclosed in further detail hereinafter.

**BRIEF DESCRIPTION OF THE DRAWINGS**

A more complete understanding of the invention the advantages associated with the invention will become further apparent from the detailed description which follows, particularly when considered in conjunction with the drawings in which:

- Figure 1 is a side exploded view of a shoe according to the invention.
- Figure 2 is a top view of a right foot insole according to the invention;
- Figure 3 is a bottom view of a left foot insole of the invention;
- Figure 4 is a cross-sectional view along lines IV-IV of Figure 3;
Figure 5 is a cross-sectional view along line V-V of Figure 3;
Figure 6 is a cross-sectional view along line VI-VI of Figure 3;
Figure 7 is a side view of the medial side of the insole of Figure 3;
Figure 8 is a side view of the lateral side of the insole of Figure 3; and
Figure 9 is a cross-sectional view along line IX-IX of Figure 3.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, Figure 1 is a side exploded view of a shoe in accordance with the present invention. The shoe is particularly advantageous from a standpoint of dissipating heat from the shoe and in preventing heat from hot surfaces, as can be encountered in tennis or running, from overheating the foot. The shoe includes a sole/midsole assembly represented at 10, above which an advantageous multilayer assembly 12 is provided. The sole/midsole assembly 10 can have various forms depending upon the shoe's usage and/or the wearer's preferences. Thus, the sole/midsole assembly 10 can be of various designs which provide the cushioning and support functions the athlete desires for a particular sporting activity. In accordance with the invention, the multilayer assembly 12 preferably includes a heat resistant layer or film 12b. This heat resistant layer serves to inhibit the transfer of heat from, e.g., hot asphalt surfaces, to the foot. In a presently preferred form, the layer 12b is a polymeric film which has a reflective or shiny surface and a non-reflective or non-shiny surface. For example, the heat resistant layer can be a metalized Mylar material (polyethylene terephthalate), which is sandwiched between two layers 12a, 12c of material such as strobel material or strobel board. Such Mylar materials are also known as aluminized Mylar or chrome Mylar. Although the material of layers 12a and 12c is often referred to as strobel "board," it typically is a pliable material, and can include a non-woven or woven fiber material.

As shown in Figure 1, the Mylar 12b is sandwiched between a first layer 12a of strobel material and a second layer 12c of strobel material. This strobel sandwich is strobel stitched to the upper 14, with the strobel stitching represented at 12d in Figure 1. As noted above, the Mylar material is preferably a metalized Mylar, which typically includes a reflective or "shiny" side and a non-reflective or "non-shiny" side. Where it is desirable to
prevent excessive heat to the foot, the Mylar sheet is disposed such that the shiny or reflective side faces down. With this arrangement, the Mylar film acts as a barrier to reduce or inhibit the transfer of heat from a hot surface, such as a tennis court of asphalt surface, to the foot. If, however, it is desired to retain heat, the layer 12b is disposed such that the shiny or reflective surface faces upwardly, toward the insole.

In accordance with a particularly preferred form of the invention, the shoe prevents excessive heating of the foot, and the shiny or reflective surface of the layer 12b faces down, toward the midsole, while the non-shiny or non-reflective surface faces up, toward the insole. Since the Mylar film is extremely thin, it will not detract from the performance of the shoe from a cushioning/support standpoint. In fact, the Mylar film can be quite thin, such that it is barely visible between the layers of strobel material when the multilayer assembly 12 is viewed in cross-section. The heat resistant film adheres well to fabrics such as strobel board. Further, since the heat resistant film is sandwiched within the strobel material, the durability of the Mylar film essentially becomes the same as that of the strobel material. Thus, problems associated with delamination or deterioration of the Mylar film are avoided with the arrangement of the invention. As noted earlier, if the shoe is to be utilized under conditions in which it is desired to retain foot heat, the same multilayer assembly 12 can be used, with the heat resistant film disposed such that the reflective or shiny side faces upwardly toward the upper.

In the arrangement of Figure 1, additional venting features are provided to further assist in modulating the foot temperature under potentially hot conditions. In combination with the use of a heat resistant film, such as metalized Mylar having the shiny or reflective side down, the venting features further assist in keeping the foot cool and dry. The venting features include a series of openings 16, 17 disposed in the upper to allow the foot to breathe through the openings. If desired, these openings can be covered (preferably from the interior of the shoe) utilizing a mesh/screen material, such as a fine wire or nylon mesh material. This mesh material allows the foot to breathe through the openings while also providing protection to the foot and preventing debris from entering into the shoe through the openings. The mesh material can also assist in maintaining the structural integrity of the upper despite the presence of the openings. The openings extending through the upper can include elongated...
slot openings as shown at 16 and/or a plurality of circular openings or perforations as shown at 17. Of course, openings of other sizes and shapes could also be utilized. These openings provide ventilation for the interior of the shoe through the upper of the shoe and to locations in the upper portion of the foot, i.e., above the multilayer assembly and above the shoe insole.

In addition to the vent openings 16, 17, a vent opening 20 is provided for ventilation of the shoe in the region above the multilayer assembly 12 and below the insole. Details of an insole which can advantageously cooperate with vent openings 20 are discussed hereinafter. Preferably, vent openings 20 are provided on both the lateral and the medial sides of the shoe. In the arrangement shown in Figure 1, when the shoe is assembled, a portion of the upper is received within the midsole, such that an aperture 20a extending through the midsole aligns with the aperture 20b extending through the upper, to form the vent opening 20. As with the openings or apertures 16, 17 discussed above, the vent opening 20 can also be covered with a mesh/screen material 20c.

As noted above, the vent openings 20 communicate with the interior of the shoe at a location between the multilayer assembly 12 and the insole. Such an arrangement can be advantageous in a number of respects. First, as noted above, the multilayer assembly 12 reduces the amount of heat which can pass from a hot surface to the wearer's foot. Second, heat can be removed from the wearer's foot utilizing the vent openings 20, as well as vent openings 16, 17. Further, the ventilation through the opening 20 (and utilizing the ventilation system provided in the insole described hereinafter) is also more effective in view of the fact that the heat resistant film of the multilayer assembly 12 is disposed beneath the insole assembly so that heat transfer from a hot surface to air within the ventilation system is also inhibited. Thus, the multilayer assembly 12 can assist in reducing heat transfer from a hot surface to the foot, and also in reducing heat transfer from the hot surface to the air of the ventilation system to thereby enhance the effectiveness of the ventilation system.

Figures 2 and 3 are, respectively, top and bottom views of an insole in accordance with the present invention. (Figure 2 corresponds to a top view of a right foot insole, while Figure 3 corresponds to a bottom view of a left insole.) The insole (sometimes also referred to as a sock liner) is removable in a presently preferred form of the invention. Alternately,
the insole can be fastened within the shoe by various expedients or combinations of expedients, including adhesive bonding or stitching. The insole 30 is disposed above the multilayer assembly 12 and inside of the upper 14.

As shown in Figures 2 and 3, the insole 30 includes a bottom support 32, which supports the wearer’s foot. This bottom support 32 includes a top surface 32a, a bottom surface 32b, and a plurality of apertures 34 extending through the insole from the top surface to the bottom surface. As shown in Figure 3, the insole includes a heel region 36, a central region 38, and a forefoot region 40. The apertures 34 are preferably, but need not be, provided in each of these regions. In the central region 38, a plurality of channels are additionally formed in the bottom surface 32b of the bottom support 32 of the insole. These channels 42 assist in the dissipation of air/heat through the apertures 34 and to the exterior of the shoe, since the channels provide communication paths or passageways from the apertures 34 to the vent openings 20. In accordance with the present invention, it is preferable to provide the channels 42 in the central region 38 of the insole, since the central region is typically that which requires the most heat dissipation. Moreover, if a contoured/channeling structure is provided in the heel or forefoot regions of the foot, such channels could cause discomfort or otherwise interfere with the cushioning/support features of the shoe provided by the sole/midsole assembly. The channels 42 can extend in the lengthwise direction of the shoe, and can also extend transverse thereto as shown. As shown in Figure 3, a large channel 42a extends across the bottom surface 32b of the insole in the central region 38. This large channel 42a communicates with the vent openings 20 which extend through the shoe (e.g., via openings 20a, 20b provided in the midsole and upper) as discussed earlier. Thus, the vent openings 20 provided in the medial and lateral sides of the shoe communicate with the channel 42a. The channel 42a, in turn, communicates with the remaining channels 42 on the bottom surface 32b of the insole, so that air and heat can pass along the bottom surface of the insole and through the apertures 34 to cool the bottom of the foot. The circulation of air utilizing the ventilation system is further enhanced as the wearer presses against and releases force from the insole, as the insole and the air passageways are compressed and released during movement of the wearer.

Figures 4-6 are cross-sectional views of the insole 30, respectively taken along lines
IV-IV, V-V, and VI-VI of Figure 3. By way of further illustration, Figure 7 is a side view of the insole of Figures 2 and 3 on the medial side of the insole. Figure 8 is a lateral side view of the insole of Figures 2 and 3. Figure 9 is a cross-sectional view of the insole along section IX-IX of Figure 3.

As shown in Figures 4-6, the insole 30 can include a foamable material 50, such as a foamable resin material, with a fabric 52, such as a nylon or polyester lining, disposed over the foamable resin 50. Typically, the lining 52 and foamable resin material 50 are associated with each other and thereafter are compression molded to the desired insole shape. The perforations 34 through the insole 30 can be molded or, if desired, can be formed by die cutting the insole after compression molding. As shown in Figures 3 and 5, a raised boss 54 can be provided within the enlarged channel region 42a. This raised boss 54 can provide a location to display a logo, and also can provide a flow diverter, so that air does not simply pass from the lateral vent opening to the medial vent opening 20 without aerating the remainder of the insole. In addition, this boss 54 can ensure adequate support in the central region 38 of the shoe, particularly in the region in which the enlarged channel is provided.

As shown in Figures 5 and 6, the insole 30 will preferably include an upwardly extending portion 56 on the medial side of the shoe and an upwardly extending portion 58 on the lateral side of the shoe. Channels and apertures can also be provided in the upwardly extending portions 56, 58 to further enhance the ability of the shoe to keep the foot cool and dry. In the embodiment shown, apertures 60 (Figs. 3 and 8) extend through upwardly extending portion 58 the insole on the lateral side of the shoe, while the upwardly extending portion 56 on the medial side of the insole includes both apertures 62 and channels 64 (Figs. 3 and 7). As shown in Figs. 3 and 7, the channels 64 can include intersecting channels, with channels 64a extending upwardly and channels 64b extending in the lengthwise direction of the foot. The lowermost channel 64b is disposed adjacent to the enlarged channel 42a of the bottom surface of the insole, such that the medial vent opening 20 of the shoe can communicate with both the channels disposed on the bottom surface 32b of the insole as well as the channels 64 of the upwardly extending medial portion 56.

As should be apparent from the foregoing, the present invention is advantageous in a number of respects. By providing a heat resistant layer, particularly a metalized Mylar
(polyethylene terephthalate), disposed between two pieces of strobel material, an effective and durable multilayer assembly is provided which can modulate the temperature of the foot. When utilized in the preferred arrangement of the present invention to keep the foot cool and dry, the multilayer assembly is effective in not only inhibiting heat from hot surfaces from transferring to the foot, but also in inhibiting the transfer of heat to the ventilation system of the invention to prevent deterioration of the performance of the ventilation system. As is also apparent, the present invention provides an advantageous ventilation system which provides for circulation of air beneath the foot, without detracting from the support/cushioning functions of the remainder of the shoe. The ventilation system is particularly advantageous in providing for flow channels or passageways in the central region of the foot at the bottom of the insole, to provide passageways for air and heat which can flow through apertures extending through the insole.

Obviously, numerous modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced otherwise and as specifically described herein.
Claims:

1. A shoe comprising:
   (a) a midsole;
   (b) an upper fastened to said midsole;
   (c) a multilayer assembly disposed above said midsole, said multilayer assembly comprising:
      (i) a first layer of material;
      (ii) a second layer of material; and
      (iii) a heat resistant film material disposed between said first and second layers of material.

2. A shoe as recited in claim 1, wherein said heat resistant film comprises polyethylene terephthalate.

3. A shoe as recited in claim 1, wherein said heat resistant film includes a reflective surface which faces toward said midsole.

4. A shoe as recited in claim 3, wherein said heat resistant film includes a non-reflective surface which faces toward said upper.

5. A shoe as recited in claim 3, wherein said heat resistant film comprises metalized polyethylene terephthalate.

6. A shoe as recited in claim 1, wherein said multilayer assembly is stitched to said upper, and said heat resistant film is adhered to said first and second layers of material.

7. A shoe as recited in claim 6, wherein said heat resistant film comprises metalized polyethylene terephthalate.

8. A shoe as recited in claim 7, wherein said metalized polyethylene terephthalate
includes a reflective surface which faces toward said midsole and a non-reflective surface which faces toward said upper.

9. A shoe as recited in claim 8, further including a ventilation system which allows for the transfer of air from locations beneath a wearer’s foot, said ventilation system including:

(i) an insole having a bottom support upon which a wearer’s foot is supported, said bottom support having top and bottom surfaces;

(ii) a plurality of apertures extending through said bottom support of said insole from said top surface to said bottom surface;

(iii) at least one vent opening extending through said shoe to provide a passageway between an exterior of said shoe and an interior of said shoe;

(iv) a plurality of channels disposed on said bottom surface of said insole, wherein said channels provide a passageway between at least some of said plurality of apertures and said at least one vent opening.

10. A shoe as recited in claim 9, wherein said at least one vent opening includes a first vent opening extending through a lateral side of said shoe and a second vent opening extending through a medial side of said shoe.

11. A shoe as recited in claim 10, wherein said first and second vent openings each include a first aperture extending through said upper and a second aperture extending through said midsole, wherein said second aperture is aligned with said first aperture.

12. A shoe as recited in claim 11, further including a mesh material extending across said first and second vent openings.

13. A shoe as recited in claim 9, wherein said plurality of apertures extending through said bottom support of said insole include:
(i) a first plurality of apertures in a heel portion of said insole;

(ii) a second plurality of apertures disposed in a central portion of said insole; and

(iii) a third plurality of apertures disposed in a forefoot portion of said insole;

wherein said plurality of channels are disposed in said central portion of said insole.

14. A shoe as recited in claim 13, wherein said multilayer assembly is disposed between said insole and said midsole.

15. A shoe as recited in claim 1, further including an insole, wherein said multilayer assembly is disposed between said insole and said midsole, said shoe including a first vent opening extending through a medial side of said shoe and a second vent opening in a lateral side of said shoe, said insole including a plurality of channels, and wherein said first and second vent openings are in communication with said channels.

16. A shoe as recited in claim 15, wherein said first and second vent openings each include a first aperture extending through said midsole and a second aperture extending through said upper and aligned with said first aperture, and wherein a mesh material extends across said first and second vent openings, and wherein said first and second layers of said multilayer assembly comprise strobel material.

17. A shoe as recited in claim 1, further including an insole, wherein said multilayer assembly is disposed between said insole and said midsole.

18. A shoe as recited in claim 17, wherein said insole includes a molded foam material and a lining disposed on said molded foam material, said insole further including:

(i) a bottom support upon which a wearer's foot is supported, said bottom support including a heel region, a central region and a forefoot region;

(ii) a first upwardly extending portion disposed on a medial side of said
insole;

(iii) a second upwardly extending portion on a lateral side of said insole;

(iv) a plurality of apertures extending through said bottom support, said plurality of apertures including apertures in each of said heel, central and forefoot regions;

(v) a plurality of channels disposed on a bottom surface of said bottom support; and

(vi) at least one of a plurality of apertures and a plurality of channels disposed in said first upwardly extending portion.

19. A shoe as recited in claim 18, wherein at least some of the apertures disposed in said central region are disposed in and extend from said plurality of channels disposed on said bottom surface, and wherein said first upwardly extending portion includes a plurality of channels and a plurality of apertures, and further wherein at least one of said plurality of channels disposed on the bottom surface of said bottom support, and wherein said shoe includes at least one vent opening disposed on a medial side of said shoe, said at least one vent opening extending through said upper and said midsole, and wherein said at least one vent opening is in communication with said plurality of channels disposed on the bottom surface of said bottom support.

20. A shoe as recited in claim 19, wherein said second upwardly extending portion includes at least one of a plurality of apertures and a plurality of channels, and wherein said shoe further includes at least one vent opening on a lateral side of said shoe which is in communication with said plurality of channels on said bottom surface of said bottom support.

21. A shoe comprising:

(a) an upper;

(b) a midsole; and

(c) an insole disposed above said midsole, said insole having:
(i) a bottom support upon which a wearer's foot is supported, said bottom support having top and bottom surfaces, a heel region, a central region and a forefoot region;
(ii) a plurality of channels disposed on said bottom surface of said bottom support in said central region; and
(iii) a plurality of apertures extending through said insole from said top surface to said bottom surface in said central region.

22. A shoe as recited in claim 21, further including a multilayer assembly disposed between said insole and said midsole, said multilayer assembly including a first layer and a heat resistant film, said heat resistant film including a reflective surface facing toward said midsole.

23. A shoe as recited in claim 22, wherein said multilayer assembly further includes a second layer, and wherein said heat resistant film is disposed between said first and second layers, said heat resistant film further including a non-reflective surface which faces toward said insole.

24. A shoe as recited in claim 23, wherein said first and second layers comprise strobel material, wherein said multilayer assembly is stitched to said upper, and wherein said heat resistant film is adhered to said first and second layers.

25. A shoe as recited in claim 24, wherein said heat resistant film is a metalized polyethylene terephthalate.

26. A shoe as recited in claim 21, further including a vent opening disposed on a medial side of said shoe which is in communication with said plurality of channels disposed on said bottom surface of said insole.

27. A shoe as recited in claim 26, wherein said insole includes a first upwardly
extending portion which extends from said bottom support, said first upwardly extending portion including a plurality of channels and a plurality of apertures extending through said insole.

28. A shoe as recited in claim 27, wherein said plurality of channels of said first upwardly extending portion are in communication with said vent opening.

29. A shoe as recited in claim 28, further including a plurality of apertures extending through said heel region of said midsole and a plurality of apertures extending through said forefoot region of said midsole.

30. A shoe as recited in claim 29, wherein said insole further includes a second upwardly extending portion on a lateral side of said shoe, said second upwardly extending portion including a plurality of apertures extending through said insole.

31. A shoe as recited in claim 28, further including a multilayer assembly disposed between said insole and said midsole, said multilayer assembly including:

(i) a first layer;

(ii) a second layer;

(iii) a heat resistant film disposed between said first layer and said second layer, said heat resistant film including a reflective surface facing toward said midsole and a non-reflective surface facing toward said insole.

32. A shoe as recited in claim 31, wherein said first and second layers are strobel material, said heat resistant film is a metalized polyethylene terephthalate, and wherein said multilayer assembly is stitched to said upper.

33. A shoe as recited in claim 26, further including a vent opening disposed on a lateral side of said shoe which is in communication with said plurality of channels disposed
on said bottom surface of said insole.

34. A shoe as recited in claim 33, further including a multilayer assembly disposed between said insole and said midsole, said multilayer assembly including:

(i) a first layer;
(ii) a second layer;
(iii) a heat resistant film disposed between said first layer and said second layer, said heat resistant film including a reflective surface facing toward said midsole and a non-reflective surface facing toward said insole.

35. A shoe as recited in claim 34, wherein said first and second layers are strobel material, said heat resistant film is a metalized polyethylene terephthalate, and wherein said multilayer assembly is stitched to said upper.

36. A shoe as recited in claim 21, further including at least one vent opening extending through said upper and into said shoe at a location above said bottom support of said insole, and at least one vent opening extending through said upper and into said shoe at a location below said insole, and wherein a mesh material extends across each of said vent openings.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :A4B 7/06
US CL :36/8R, 3B, 3A

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)

U.S. : 36/8R, 3B, 3A, 44, 50R

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

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

None

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>EP 0,350,103 A (CHEOL) 10 January 1990, see whole reference.</td>
<td>21, 26-29, and 33</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9-14, 18-20, 22-25, 30, 31, 32, 34-36</td>
</tr>
<tr>
<td>Y</td>
<td>US 5,220,791 A (BULZOMI) 22 June 1993, see whole reference.</td>
<td>1, 3, 4, 15, and 17</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1-36</td>
</tr>
<tr>
<td>X</td>
<td>US 4,888,887 A (SOLOW) 26 December 1989, see whole reference.</td>
<td>11 and 12</td>
</tr>
<tr>
<td>Y</td>
<td>FR 2,670,369 A (NICULAE) 19 June 1992, see whole reference.</td>
<td>12 and 36</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
* "A" document defining the general state of the art which is not considered to be of particular relevance
* "E" earlier document published on or after the international filing date
* "L" document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
* "O" document referring to an oral disclosure, use, exhibition or other means
* "P" document published prior to the international filing date but later than the priority date claimed

Later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

Document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

Document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

Document member of the same patent family

Date of the actual completion of the international search: 27 FEBRUARY 2002

Date of mailing of the international search report: 15 MAR 2002

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks

Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-9230

Authorized officer

MARIE PATTERSON

Telephone No. (703) 308-0060

Form PCT/ISA/210 (second sheet) (July 1998)*
### INTERNATIONAL SEARCH REPORT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 3,624,930 A (JOHNSON ET AL) 07 December 1971, see whole reference.</td>
<td>18 and 19</td>
</tr>
<tr>
<td>Y</td>
<td>US 5,845,418 A (CHI) 08 December 1998, see whole reference.</td>
<td>20 and 30</td>
</tr>
</tbody>
</table>

Form PCT/ISA/210 (continuation of second sheet) (July 1998)