

SUPERINTENDENCIA DE INDUSTRIA Y COMERCIO
DIRECCIÓN DE NUEVAS CREACIONES

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(Apoderada)

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ASUNTO	Radicación	07 - 8638
	Trámite	002
	Evento	001
	Actuación	430
	Oficio	08522
	Folios	076

Patente de Invención	☒	Patente de Modelo de Utilidad	☐
Vía Nacional	☒		
Vía PCT (fase nacional)	☐	Cap. I	☐
		Cap. II	☐
Solicitud Internacional n.º			
Fecha de Presentación Intrnl.			

Como resultado del examen de fondo, realizado con fundamento en el artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le comunica:

1.Documentos estudiados

<u>Descripción:</u>	Folios 75 a 102 como se radicó inicialmente
<u>Reivindicaciones:</u>	Folios 103 a 108 como se radicó inicialmente
<u>Dibujos:</u>	Folios 109 a 126 como se radicó inicialmente
<u>Prioridad:</u>	Folios 19 a 73; 2006-05-18, US, 11/419 043

2. Objeto de la invención

Título de la solicitud: *Suela para calzado con tubos de soporte*, folio 1.

El objeto de la presente solicitud de patente de invención consiste en suministrar un conjunto de elementos que colaboran entre sí para brindar ciertas características de comodidad y resistencia al usuario de un calzado. Tales elementos son: una suela externa, un calce de talón, un inserto y una entresuela. Aunque el capítulo reivindicatorio se limita a reclamar el inserto, únicamente.

El problema planteado en esta solicitud es satisfacer la necesidad de ajustar las suelas de los calzados a las necesidades de los usuarios, respecto a la resistencia, la comodidad y la durabilidad del calzado.

Para solucionar este problema técnico la solicitud en estudio proporciona un conjunto o sistema de suela que comprende una suela externa, un calce de talón, un inserto y una entresuela interna. Estos elementos se moldean de tal manera que se ajusten entre sí. El inserto reivindicado tiene dispuestos unos tubos huecos que llevan en su núcleo unas membranas diametrales dispuestas en una orientación específica, adecuada a los esfuerzos que, se prevé, deben soportar durante el uso.

Clasificación Internacional de Patentes (IPC): A43B 13/14, 13/18, 13/20

3. De la solicitud de Patente

Antes de entrar en detalles específicos, se le dan al solicitante ciertas indicaciones generales, algunas de las cuales son aplicables a este caso y todas deberán ser tenidas en cuenta en las eventuales modificaciones:

El título o nombre de la invención debe concordar con lo que se reclama en el capítulo reivindicatorio. Esto es, si en las reivindicaciones se reclama un producto, tal producto debe ser mencionado en el título, y si en las reivindicaciones se reclama un procedimiento o un sistema o un método, también debe ser mencionado allí. Normalmente, el título debe contener máximo diez palabras aunque eventualmente pueden ser más. El título no debe contener palabras cuyo significado no esté reconocido dentro del sector de la técnica de que se trate. Preferiblemente, deben ser palabras cuyo significado se encuentre en el Diccionario de la Real Academia Española (DRAE).

En Colombia, la máxima autoridad en cuestiones del lenguaje es la Academia Colombiana de la Lengua. En caso de duda sobre el significado de las palabras, se debe acoger la definición que trae el Diccionario de la Real Academia Española (DRAE).

En Colombia, es de uso obligatorio el Sistema Internacional de unidades. Esto implica, también, que la coma decimal es de uso obligatorio. Cuando aparezca algún valor con unidades diferentes a las exigidas, deberá incluirse su correspondiente conversión al Sistema Internacional.

La parte técnica de la solicitud se divide en tres secciones, debidamente separadas, preferiblemente en este orden: El capítulo descriptivo, el capítulo reivindicatorio y el juego de dibujos o figuras. Se prefiere que el texto se presente escrito de manera mecánica, en una sola columna. Ninguna de estas secciones podrá llevar membretes (encabezamientos o pies de página) ajenos al contenido técnico de la solicitud.

Por lo menos el capítulo descriptivo debe estar debidamente paginado y estar escrito a doble espacio, con el fin de facilitar la referencia a los apartados del texto. Se debe evitar, en lo posible, el uso de mayúsculas corridas, hay que recordar que ese empleo equivale a gritar en el lenguaje oral. Se pueden emplear las mayúsculas para resaltar ciertos apartados del texto, pero si todo el texto está escrito en mayúsculas, nada queda resaltado.

La terminología empleada en la descripción y en las reivindicaciones debe ser igual para designar las diferentes partes, piezas, elementos, detalles o aspectos de lo que se mencione en ellas; los cuales, a su vez, deben estar designados con números o signos de referencia.

Dentro del texto de la descripción y las reivindicaciones se aconseja encerrar entre paréntesis el número o signo de referencia cada vez que se mencione el detalle correspondiente, con el fin de distinguirlo de otros tipos de números o signos que eventualmente aparezcan allí. Estos números o signos de referencia deben aparecer dentro del juego de dibujos (preferiblemente, sin paréntesis, aunque pueden estar encerrados dentro de un círculo) siempre acompañados de líneas o flechas que señalen o indiquen a qué parte, pieza, elemento o aspecto se encuentran asociados.

Las reivindicaciones deben estar numeradas individual y consecutivamente (1, 2, ... 5, 6, etc.) El capítulo reivindicatorio no debe tener subtítulos.

Normalmente se pueden encontrar dos categorías de reivindicaciones: una, la de producto; y, la otra, de procedimiento.

En las reivindicaciones se deben definir los alcances de la protección que desea el solicitante. En consecuencia, las reivindicaciones forman un cuerpo aparte de la descripción y como tal debe ser redactado: la primera vez que se mencione un nombre dentro de las reivindicaciones debería estar acompañado de un artículo indeterminado; y, la inclusión -entre paréntesis- de un número de referencia no sustituye la definición del elemento o aspecto al que se refiere, simplemente sirve de información complementaria. Se debe entender que la descripción sirve para interpretar las reivindicaciones y, en consecuencia, si en una reivindicación se reclama un aparato, por ejemplo, no se deberían mencionar aspectos del funcionamiento del aparato dentro de la reivindicación, limitándose a definir únicamente los elementos que constituyen el aparato.

Para detectar si una definición de producto está bien hecha, se debe poder responder a la cuestión: ¿cómo es el producto reclamado? Si no se puede dar una respuesta razonable, es porque el producto está mal definido o no ha sido definido en absoluto. Otra prueba común es la de invertir el razonamiento: ¿son las características definidas -en determinada reivindicación- propias de un producto? Si la definición de una característica de un producto empieza por un verbo, muy seguramente no es una característica propia del producto.

Normalmente no se puede definir un producto por el procedimiento de su obtención, porque el producto, en la mayoría de los casos, es producido en cantidades industriales por una variedad de procedimientos, muchos de los cuales no dejan trazas o huellas que se puedan detectar satisfactoriamente en el producto terminado y puesto a disposición del público.

Por lo demás, los productos industriales son bienes tangibles, son algo concreto, tienen existencia física, y por tanto son susceptibles de definición mediante sus características físicas -en la mayoría de los casos- o físico-químicas en los restantes, aunque existen unas pocas excepciones -que pertenecen a ciertas tecnologías emergentes- en donde resulta más fácil su identificación por el procedimiento de obtención, pero éste no es el caso en la presente oportunidad.

Cada una de las figuras debe estar debidamente identificada, preferiblemente con un número consecutivo: Figura 1, figura 2, ...

Las figuras deben ser realizadas siguiendo las reglas del dibujo técnico.

Se prefiere que dentro de las figuras no se incluya ningún texto. Cada uno de los detalles ilustrados en las figuras deberá estar señalado con un número o signo de referencia, el cual será el mismo en todas las figuras en donde se encuentre el detalle en cuestión. Si en alguna figura no se

encuentran números de referencia, se entiende que no se va a decir nada sobre ella dentro del texto de la descripción y, entonces, es preferible que se omita tal figura. Análogamente, si en una figura no se encuentra señalado algún detalle con el respectivo número de referencia, es preferible que se omita tal detalle.

La patente de **modelo de utilidad** no puede incluir los procedimientos, por definición. Si alguna de las reivindicaciones de una solicitud de patente de modelo de utilidad reclama un procedimiento, debe ser suprimida.

Descripción (artículo 28 D. 486)

Durante el análisis del texto de la descripción y de las ilustraciones anexadas, se observaron los siguientes defectos:

- 1) El título o nombre de la invención *Suela para calzado con tubos de soporte* no es adecuado, en primer lugar porque, *suela* según el Diccionario de la Real Academia Española (DRAE), significa *Parte del calzado que toca al suelo, hecha regularmente de cuero fuerte y adobado*, y, según se desprende de la descripción y los dibujos, lo revelado en la solicitud es un conjunto de suela o un sistema de suela, no la suela propiamente dicha; en segundo lugar, lo que se reclama en las reivindicaciones es un *inserto*, no una suela -por lo que no hay concordancia entre uno y otras-; y, en tercer lugar, lo que tiene los tubos de soporte es [el conjunto de] la suela, no directamente en calzado.
- 2) En la página 1, folio 75, aparece la expresión *Esta solicitud es una continuación en parte de la solicitud de patente estadounidense 11/143 063 presentada en junio 2, 2005...* que se refiere a una figura legal que no existe en Colombia, por lo que debe ser suprimida.
- 3) En la página 2, folio 76, aparece por primera vez una sigla (EVA) que no se encuentra debidamente acompañada por su significado. Cada una de las siglas utilizadas en la solicitud (esto es, las siglas *EVA*, *PVC*, *TPU*, *TPR*) deberán estar acompañadas por su significado en la primera oportunidad en que se utilicen.
- 4) En la página 3, folio 77, aparece por primera vez el término *red*. El DRAE lo define como una especie de malla, en la acepción más cercana al contexto, pero este significado no corresponde a lo que se describe y se ilustra. Se le sugiere al solicitante que lo sustituya por *membrana* u otra expresión que se ajuste mejor a lo que el solicitante quiere decir. El solicitante debe estar atento al hecho de que, en la página 14, folio 88, el texto dice: *las redes (48a) a (48j) son cuerdas* que es de difícil interpretación.
- 5) En la página 5, folio 79, aparece por primera vez el término *durómetro*. Este término no se encuentra en el DRAE, por lo que se debería utilizar una definición alternativa. El examinador encontró que el *Diccionario Enciclopédico McGraw-Hill Ilustrado, 2001*, define este término como *Instrumento que mide la dureza de un material*. Sin embargo, esta definición no concuerda con el contexto, como se puede apreciar en la siguiente objeción.
- 6) En la misma página 5 aparece la expresión *...un segundo material... tiene un valor durómetro inferior que es el primer material* que carece de sentido, no sólo por el empleo del término *durómetro*, sino por el uso de expresiones contradictorias: *...un segundo material... que es el primer material*.
- 7) En la página 6, folio 80, aparece la expresión *...dirigiendo por lo tanto el problema de [la] sobrepronación* que carece de sentido.

8) En la página 9, folio 83, aparece la expresión *...tal como la suela 200 mostrada en la figura 2*. Pero, en la figura 2, folio 110, aparecen dos números de referencia (200), ninguno de los cuales señala hacia la suela. Encontramos, entonces, que hay tres errores: el primero, decir que el número de referencia (200) corresponde a la suela; el segundo, remitirse a la figura 2; y, el tercero, utilizar un mismo número de referencia (200) para señalar en la figura 2 dos detalles o partes diferentes.

9) En la misma página 9 aparecen las expresiones *puede incluir un 202 superior, parte superior 202 de la suela 10*, que son objetadas porque, en primer lugar, los números de referencia no sustituyen la definición del detalle o parte al que se encuentra asociado; y, en segundo lugar, el número de referencia (202) se encuentra en la figura 12, folio 121, no en la figura 2, folio 110, como sería de suponer por el contexto. Incidentalmente, se le sugiere al solicitante que encierre entre paréntesis a los números de referencia que se encuentren dentro del texto de la solicitud, entre otras cosas, con el fin de distinguirlos claramente de otro tipo de números que eventualmente aparecen en las solicitudes de patente.

10) En la misma página 9 aparece la expresión *...utiliza esencialmente cualquier construcción de unión, que incluye sin limitación... y dirige construcciones de unión* que carece de sentido.

11) En la página 10, folio 84, aparece la expresión *línea(s) fantasma(s)* cuyo significado se desconoce.

12) En la página 12, folio 86, aparece por primera vez la expresión *el calce de talón (14)... tiene forma de calce* que carece de sentido, porque lo que se define no debe entrar dentro de la definición. Se le sugiere al solicitante sustituir la expresión objetada por *el calce de talón (14)... tiene forma de cuña* u otra expresión que se ajuste mejor a lo que el solicitante quiere decir.

13) En la misma página 12 aparece la expresión *...el calce de talón... tiene una superficie superior (26)... para completar la forma de la superficie inferior (30) del inserto (16) y la superficie inferior (32)... para completar la forma de la superficie superior (34) de la suela externa (12)* que se objeta, en primer lugar, porque en ninguna figura se encuentra señalado el número de referencia (32); y, en segundo lugar, porque la superficie superior (26) no completa la forma de la superficie inferior (32) como aparece en el texto.

14) En la misma página 12 aparece la expresión *la superficie superior (26)... incluye una pluralidad de cavidades de tubo 36a-j* que carece de sentido, entre otras cosas, porque debería señalarse (36a) hasta (36j), pero, más importante, porque dentro de las figuras no se encuentran los número de referencia (36a) hasta (36j).

15) En la misma página 12 aparece la expresión *superficie inferior (30)* pero también aparece la expresión *la abertura (30)*. Este no es un simple error de mecanografía, porque en la figura 10, folio 119, el número de referencia (30) sí se encuentra señalando a la superficie inferior; pero, en la figura 11, folio 120, el número de referencia (30) está señalando una *abertura*. El solicitante debe designar cada cosa con un número de referencia diferente, conservando el mismo número para señalar al mismo detalle que se encuentre ilustrado en las diferentes figuras.

16) En la página 17, folio 91, aparece por primera vez la expresión *y/o*. Al respecto, el *Diccionario panhispánico de dudas* de la Real Academia Española y de la Asociación de Academias de la Lengua Española, primera edición, octubre de 2005, página 681, dice:

y/o: Hoy es frecuente el empleo conjunto de las conjunciones copulativa y disyuntiva separadas por una barra oblicua, calco del inglés «and/or», con la intención de hacer explícita la posibilidad de elegir entre la suma o la alternativa de dos opciones: «Se necesitan traductores de inglés y/o francés».

Se olvida que la conjunción 'o' puede expresar en español ambos valores conjuntamente.

El examinador ha subrayado la última frase porque es particularmente aplicable a este caso.

17) En la misma página 17 aparece el término *nylon*. El solicitante debe sustituirlo. Puede escoger entre *naïlon* o *nilón*, a voluntad.

18) En la página 18, folio 92, aparece la expresión *entresuela* (148) pero dentro de las figuras no se encuentra este número de referencia.

19) En la página 21, folio 95, aparece la expresión *inserto* (1601) pero dentro de las figuras no se encuentra este número de referencia.

20) En la página 22, folio 96, aparecen las expresiones *suela externa* (120), *calce de talón* (140), *inserto* (60), *tubos de soporte* (460a) a (460j), *puntales* (380a) a (380d), *aletas* (500a), (500b) pero dentro de las figuras no se encuentran estos números de referencia.

21) En la página 23, folio 97, aparece la expresión *una base generalmente plana* (550a) a (550e) pero sólo se encuentran señalados los números de referencia (550a) a (550d). Algo similar sucede con los rangos (570a) a (570e), (550a) a (550e) que también se encuentran en esta página [y en la siguiente].

22) En la página 24, folio 98, aparece la expresión *la parte anterior del pie más delantero* que es de difícil interpretación.

23) En la misma página 24 se encuentra por primera vez el término *argollas* cuyo significado, según el DRAE, no corresponde a lo que se ilustra en la solicitud.

24) En la página 25, folio 99, aparece la expresión *tubos de soporte de la parte anterior del pie* (500a) a (500e) que debe ser corregida, porque en la página 22, folio 96, se habían definido los números de referencia (500a) y (500b) como aletas y porque no se señalan los números de referencia (500c) a (500e) en ninguna de las figuras.

25) En la página 27, folio 101, aparecen citados los números de referencia (360) y (800) que no se encuentran señalados en ninguna de las figuras.

La descripción no cumple con los requisitos de claridad y divulgación completa, lo que dificulta o impide su comprensión y ejecución de acuerdo al Art. 28 de la Decisión 486

Reivindicaciones (artículo 30 D 486)

Durante el análisis del texto de las reivindicaciones se observaron los siguientes defectos:

1) En el folio 103, inmediatamente antes de la reivindicación 1, aparece un texto que es redundante y en consecuencia debe ser suprimido, ya que afecta negativamente la concisión del capítulo reivindicatorio.

2) Lo que se reclama en las reivindicaciones (un inserto) no concuerda con lo que se anuncia en el título o nombre de la invención (una suela).

3) Se le sugiere al solicitante que inserte, entre paréntesis, los números de referencia asociados a cada una de las partes o detalles que se citan en las reivindicaciones.

4) En las reivindicaciones 2, 3 y 5, folios 103 y 104, aparece la expresión *El inserto de la reivindicación... en donde dicho inserto incluye...* que, en aras de la concisión, debe ser sustituida por *El inserto de la reivindicación... que incluye...*

5) En la reivindicación 4, folio 103, aparece la expresión *cada uno de dichos tubos de soporte se conecta [¿con qué?] para formar una red de la parte anterior del pie, dicha red de la parte anterior del pie se forma a partir de dicho primer material*, en la cual se objeta el hecho de que no se dice con qué está conectado cada tubo y el hecho de que se emplea una expresión redundante: *dicha red de la parte anterior del pie*. Incidentalmente, se objeta, también, el uso del término *red*

que no se considera concordante con el contexto -Ver la objeción a este término, arriba, con relación a la descripción- En la reivindicación 5, folio 104, y en la reivindicación 18, folio 108, volvemos a encontrar este término *red*.

6) En las reivindicaciones 14 y 15 se menciona un *inserto periférico* que no ha sido definido dentro de la descripción. Además, tampoco ha sido definido antes dentro de las reivindicaciones anteriores a la 14, por lo que las reivindicaciones 14 y 15 carecen de claridad, de definición y de sustento.

7) En la reivindicación 17, folio 107, se menciona, por primera vez dentro del capítulo reivindicatorio, el término *durómetro*, que, como se vio arriba, con relación a la descripción, tiene un significado que no concuerda con el contexto.

8) En la reivindicación 18, folio 107, aparece la expresión *dicho primer material tiene un valor de durómetro que dicho segundo material* en la cual, aparte de objetar el término *durómetro* se objeta la falta de sentido de la expresión.

9) En la reivindicación 19, folio 108, aparece la expresión *tubos de soporte trasero medio dispuesto sobre un costado medio* que carece de sentido.

10) En la reivindicación 20, se reclama *un inserto... que comprende adicionalmente: una suela externa y un calce...* que no corresponde a lo divulgado dentro de la descripción, porque el inserto, la suela externa y el calce son piezas separadas, ni la suela externa ni el calce forman parte integral del inserto -si formaran parte integral de éste, no sería un inserto, porque el resultado no se insertaría en ninguna parte del calzado, formaría una parte exterior de él- La reivindicación 20 carece de definición, de claridad y de sustento.

Debe entenderse que las reivindicaciones dependientes de las reivindicaciones objetadas son, asimismo, objetadas, por razones análogas.

Las reivindicaciones no cumplen con los requisitos de definición, claridad, concisión o sustento por la descripción de acuerdo al Art. 30 de la Decisión 486.

Se deben presentar, entonces, nuevos capítulos descriptivo y reivindicatorio, ambos completos, junto con un nuevo juego de dibujos, donde se hayan corregido todas las objeciones que se han hecho arriba. Esto con el fin de evitar -cuando solo se presentan algunas páginas sueltas corregidas- que el lector tenga que desplazarse desde un sitio a otro de la solicitud y luego regresar a donde estaba antes sin perder la ilación de la lectura, porque esto produce confusión y afecta negativamente la claridad de dichos capítulos.

Se le advierte al interesado que las modificaciones sugeridas arriba podrían resultar inconducentes si se mantienen las objeciones a la patentabilidad que se insinúan adelante.

4. **Unidad de invención** (artículo 25 D 486)

El capítulo reivindicatorio no cumple con el requisito de unidad de concepto inventivo porque contiene tres reivindicaciones independientes para reclamar una misma pieza del calzado: un inserto. En este caso, esto, por sí solo, es un indicio negativo: o bien las reivindicaciones carecen de concisión -cuando tienen unidad de concepto inventivo, porque se refieren a un producto, a un solo producto- o bien carecen de unidad de concepto inventivo -porque se refieren a dos o más productos-.

Las reivindicaciones 1 a 10, folios 103 a 105, reclaman un inserto compuesto por dos materiales y que tiene unos tubos de soporte y una pared.

Las reivindicaciones 11 a 17, folios 105 a 107, reclaman un inserto que tiene una pluralidad de tubos cuya disposición geométrica [radial, divergente] se especifica. Las reivindicaciones 18 y 19, folios 107 y 108 reclaman un inserto que también - como en el primer caso- está compuesto por dos materiales y que tiene unos tubos de soporte y una pared.

Se concluye, entonces, que lo reclamado en las reivindicaciones 1 a 10, 18 y 19 tendrían unidad de concepto inventivo mientras que lo reclamado en las reivindicaciones 11 a 17 no, porque tienen características que son independientes, no relacionadas.

El solicitante debe superar esta objeción bien sea dividiendo la solicitud en dos solicitudes fraccionarias o bien desistiendo de ciertas reivindicaciones.

5. Determinación del Estado de la Técnica

La fecha que se ha tenido en cuenta para determinar el Estado de la Técnica es la

Fecha de presentación de la solicitud prioritaria 2006-05-18

Se realizó la búsqueda en el estado de la técnica de documentos relacionados con la solicitud teniendo en cuenta la fecha indicada; y durante la búsqueda de anterioridades se encontraron los siguientes documentos, que forman parte de la familia de patentes de la presente solicitud: Publicación US 2006/0277792 A1 del 2006-12-14; Patente US 7 398 608 B2 del 2008-07-15; publicación EP 1 857 003 A3 del 2008-01-09; y, además, otros relacionados cercanamente: Publicación US 2006/0283047 A1 del 2006-12-21; Patente US 7 395 613 B2; Publicación EP 1 728 446 A1 del 2006-12-06; y publicación EP 1 728 446 A1 del 2006-12-06. Se anexa la copia de las primeras páginas de estos documentos junto con: la copia parcial del rechazo final fechado 2007-11-27 por la USPTO -primera publicación citada-; la copia del Informe de Búsqueda Europeo -primera publicación citada-; la copia del capítulo reivindicatorio admitido por la USPTO -primera patente US citada-; la copia del Informe de Búsqueda Europeo -segunda publicación citada-; y, la copia parcial del rechazo final fechado 2007-12-19 por la USPTO -segunda publicación citada-. También se encontraron los siguientes documentos que forman parte del estado de la técnica más cercano al objeto de la solicitud:

n.º	Documento	Título	Fecha de publicación
D1	Patente US 4 506 461, cuyo inventor es Masanobu Inohara, quien le cedió sus derechos a la Asics Corporation	«Sport shoe sole»(Una suela para calzado deportivo)	1985-03-26
D2	Patente US 4 782 603, cuyo inventor es Stephen C. Brown, quien le cedió sus derechos a The Summa Group Limited	«Midsole»(Una plantilla intermedia)	1988-11-08
D3	Patente US 5 005 300, cuyos inventores son Juan A. Díaz, Mark R. Goldston, Spencer White, David E. Miller, Charles P. Legassie, Wayne Russell y Judith C. Ringel, quienes le cedieron sus derechos a la Reebok International Ltd.	«Tubular cushioning system for shoes»(Un sistema de acolchonamiento para calzado)	1991-04-09

n.º	Documento	Título	Fecha de publicación
D4	Patente US 5 224 277, cuyo inventor es Kim Sang Do	«Footwear sole providing ventilation, shock absorption and fashion»(Una suela para calzado, que suministra ventilación, absorción de golpes y comodidad)	1993-07-06
D5	Patente US 5 822 886, cuyos inventores son Simon Luthi, Xavier Kälin Wolfgang Scholz y Edgar Atüssi, quienes le cedieron sus derechos a la Adidas International, BV	«Midsole for shoe»(Una plantilla media para calzado)	1998-10-20
D6	Patente US 6 141 889, cuyo inventor es Ira M. Baum	«Foot support and method»(Un soporte para el pie y un método)	2000-11-07
D7	Publicación DE 101 23 252 A1, cuyo inventor es Bernd Kasdorf	«Flächengebilde für insbesondere einen Sporthandschuh, eine Einlegesohle oder Matte sowie Verfahren zur Herstellung des Flächengebildes»(Una estructura de tejido para guantes deportivos, plantillas o felpudos y su procedimiento de fabricación)	2002-08-08
D8	Patente US 6 782 641 B2, cuyos inventores son Jerome A. Turner y John W. Thomas, quienes le cedieron sus derechos a la American Sporting Goods Corporation	«Heel construction for footwear»(Una construcción de talón para calzado)	2004-08-31
D9	Patente US 7 013 582 B2, cuyos inventores son Robert J. Lucas, Vincent Philippe Rouiller, Allen van Noy y Stephen Michael Vincent, quienes le cedieron sus derechos a la Adidas International Marketing, BV	«Full length cartridge cushioning system»(Un sistema de cartucho de acolchamiento de longitud plena)	2006-03-21
D10 (*)	Patente de diseño US D518 285 S, cuyos inventores son Mary L Schoenborn y Donald R. Reardon, quienes le cedieron sus derechos a la Wolverine World Wide, Inc.	«Footwear sole»(Una suela para calzado)	2006-04-04

Se anexa la copia de las páginas pertinentes de estos documentos

(*) este documento -por tratarse de un diseño industrial, en el cual no se especifican características técnicas- no forma parte, propiamente, del estado de la técnica, sin embargo, dadas las características morfológicas del producto ilustrado en el documento, se considera como información complementaria.

NOTAS: No se realizaron las evaluaciones de los demás requisitos de patentabilidad, porque se hicieron algunas objeciones en cuanto a la falta de unidad de concepto inventivo y respecto a la [falta de] definición, la claridad, la concisión y el sustento por la descripción de las reivindicaciones; esto es, no se pudo practicar un análisis comparativo, por ausencia de materia.

A pesar de lo anterior, con base en las enseñanzas de los documentos encontrados hasta ahora y con base en los rechazos finales de la USPTO y los Informes de Búsqueda Europeos -citados arriba-, se prevén objeciones respecto a la novedad o respecto al nivel inventivo del objeto de la solicitud.

6. Conclusión:

Los requisitos de patentabilidad de la presente solicitud se encuentran afectados negativamente por la falta de unidad de concepto inventivo; por la falta de claridad de la descripción y las reivindicaciones; y, por la falta de definición, de sustento y de concisión de estas últimas.

En cumplimiento del artículo 45 de la Decisión 486 de la Comisión de la Comunidad Andina, se le indica que debe dar respuesta dentro del término de sesenta días contados a partir de la fecha de notificación de la presente comunicación. En caso de no dar respuesta al presente requerimiento, o si a pesar de la respuesta subsistieran los impedimentos para la concesión, se denegará la patente.

Notifíquese el presente oficio conforme a lo dispuesto en el número 5.2, letra e), del capítulo quinto del título primero de la Circular Única n.º 10 de 2001.



ALIX CARMENZA CÉSPEDES DE VERGEL
Directora de Nuevas Creaciones (C)

El anterior requerimiento fue notificado por fijación en lista, de fecha
_____ **01 JUL. 2010**

CONCEPTO TÉCNICO n.º 2236

EXAMINADOR TÉCNICO
Código n.º 202009

Application/Control Number: 11/419,043

Page 2

Art Unit: 3728

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 11-17 are finally rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 11 recites the limitation "the insert" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 1, 4, 7 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (US 4,782,603). Brown discloses a two component insert (midsole 30 with tube assemblies 50 and 60) for an article of footwear, the article of footwear having a forefoot region, the insert having a lateral side and a medial side, the insert comprising: a plurality of resilient compressible front support tubes (tube assemblies 50), each of said front support tubes defining a base, and a wall extending from said base, and; an outsole (40) positioned below said insert and forming a ground engaging wear surface for the article of footwear. See figures 1-3 embodiments.

Brown further discloses that the tubes (50, 60) themselves must be constructed from a material, which is somewhat denser than the polyurethane or other resilient material used to mold the remainder of the midsole. Because of the number of impacts,

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Final Rejection 2007-11-27

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which are imparted to the tubes, the tubes must be of sufficient resiliency and strength to resist collapse along their walls. The tubes must resist such impact forces for the lifetime of the shoe in order to provide for continued shock absorption. The tubes 50, 60 should be of sufficient hardness so as to remain in their undeformed state under the weight of the wearer. Tubes 50, 60 should only be deformed under impact loads. The density of the tubing material may be varied according to the application for which the shoe is designed. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made in view of the teachings of Brown that it is desirable to modify the material of the insert for its intended use, to make the base and walls from different material to better resist collapse along their walls. "[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill." *KSR Int'l v. Teleflex Inc.*, 127 S.Ct. 1740, 82 USPQ2d 1396 (2007).

With respect to claim 4, note the web (70) in figure 3 embodiment.

With respect to claim 10, Brown discloses that the front support tubes can be of varying lengths as shown in figure 2 embodiment. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the length of the front support tubes as an obvious matter of design choice, since such a modification would have involved a mere change in the size and shape of a component. "[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the

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technique is obvious unless its actual application is beyond that person's skill." *KSR Int'l v. Teleflex Inc.*, 127 S.Ct. 1740, 82 USPQ2d 1396 (2007). A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955) and *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

5. Claims 2-3 and 11-13 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Brown in view of Baum. Brown as described above discloses all the limitations of the claims except for the front support tubes being arranged in a radiating pattern such that they diverge as they extend from said medial side towards said lateral side.

Baum discloses that it is desirable to prepare foot inserts based upon a scan of the patient's foot, and to which ridges and grooves have been sculptured to the contour in a radial fashion resembling a Chinese fan pattern. The center of the radials of the Chinese fan is place within or outside the borders of the embodied of the foot support and located based on the patient's activity profile. Additionally, the material selected for the foot support as well as its thickness are a function of the patient profile. Depending upon the patient's activity and the particular foot type, the present invention utilizes radially spaced ridges and grooves that converge at imaginary centers outside the foot print. This is based on the fact that all activity involving the foot on the ground causes ground reactive forces that act on the foot. The ground reactive forces of gravity cause motion of the foot on the surface the foot comes in contact with. Slippage of the foot on the surface the foot is in contact contributes to less than optimum performance, increased energy consumption and increased potential for injury. Ground reactive

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forces affecting the foot are multiplanar. Particular activity has particular patterns and degree of ground reactive forces acting on the foot. Particular patterns and degrees of ground reactive forces of gravity cause particular patterns or motions to occur between the foot and the surface the foot is in contact with. Grooves and ridges reduce slippage by increasing surface contact of the surfaces. Convergent-divergent grooves and ridges reduce slippage and improve control of motion in multiple planes. Direction of convergent-divergent grooves and ridges on the surface of the foot support control motion more efficiently dependent on the pattern of ground reactive forces acting on the foot in a particular activity. The point of convergence on each individual foot support is determined by the particular activity chosen by the individual. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to arrange the front support tubes of Brown in a radiating pattern such that they diverge as they extend from said medial side towards said lateral side as taught by Baum to reduce slippage and improve control of motion in multiple planes. "[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill." *KSR Int'l v. Teleflex Inc.*, 127 S.Ct. 1740, 82 USPQ2d 1396 (2007).

FKI

6. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the above references as applied to claims 2-3 and 11-13 above, and further in view of Sang DO (US 5,224,277). Brown-Baum as modified above discloses all the limitations of the claims except for the plurality of heel support tubes including a plurality of webs,

each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with a support profile. Sang Do discloses an article of footwear with a plurality of heel support tubes for providing ventilation, shock absorption and fashion. Sang Do discloses that the support tubes can have variety of different shapes and different types of web with openings ends being open or closed for different type of cushioning effect. See Figures 13A-19A. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide plurality of webs, each of said webs being disposed within a corresponding one of said support tubes of Brown-Baum as taught by Sang do for added cushioning effect. "A combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int 'l v. Teleflex Inc.*, 127 S.Ct. 1731, 82 USPQ2d at 1396. Claims 5 and 8-9 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Brown in view of Sang Do (US 5,224,277). Brown as described above discloses all the limitations of the claims except for the plurality of heel support tubes including a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with a support profile. Sang Do discloses an article of footwear with a plurality of heel support tubes for providing ventilation, shock absorption and fashion. Sang Do discloses that the support tubes can have variety of different shapes and different types of web with openings ends being open or closed for different type of cushioning effect. See Figures 13A-19A.

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Art Unit: 3728

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide plurality of webs, each of said webs being disposed within a corresponding one of said support tubes of Brown as taught by Sang do for added cushioning effect. "A combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."

KSR Int'l v. Teleflex Inc., 127 S.Ct. 1731, 82 USPQ2d at 1396.

Allowable Subject Matter

7. Claims 6 and 18-20 allowed.
8. Claims 16 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

9. Applicant's arguments filed 09/19/2007 have been fully considered but they are not persuasive. Contrary to applicant's argument Brown as modified above clearly discloses a two-component insert, wherein each front support tubes include a base formed from a first material and a wall extending from the base that is formed from a second material.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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US007398608B2

(12) **United States Patent**
Schoenborn

(10) **Patent No.:** **US 7,398,608 B2**
(45) **Date of Patent:** **Jul. 15, 2008**

(54) **FOOTWEAR SOLE**

(56)

References Cited

(75) **Inventor:** **Mary L. Schoenborn**, Rockford, MI (US)
(73) **Assignee:** **Wolverine World Wide, Inc.**, Rockford, MI (US)
(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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4,782,603 A * 11/1988 Brown 36/29
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5,005,300 A 4/1991 Diaz et al.
5,224,277 A * 7/1993 Sang Do 36/27
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6,782,641 B2 * 8/2004 Turner et al. 36/29

FOREIGN PATENT DOCUMENTS

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DE 10123252 8/2002

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(74) *Attorney, Agent, or Firm*—Warner Norcross & Judd LLP

(21) **Appl. No.:** **11/419,043**

(22) **Filed:** **May 18, 2006**

(65) **Prior Publication Data**

US 2006/0277792 A1 Dec. 14, 2006

Related U.S. Application Data

(63) Continuation-in-part of application No. 11/143,063, filed on Jun. 2, 2005.

(51) **Int. Cl.**
A43B 13/18 (2006.01)
A43B 13/20 (2006.01)

(52) **U.S. Cl.** **36/28: 36/29: 36/30 R: D2/946**

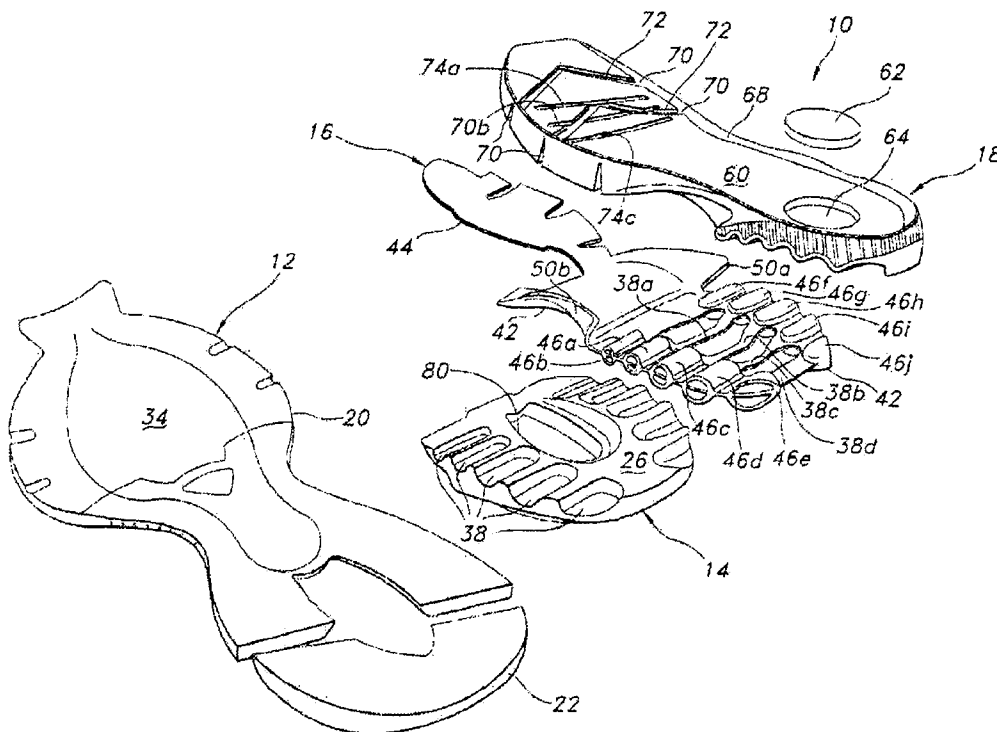
(58) **Field of Classification Search** **36/27–29, 36/31, 3 B, 35 B, 25 R: D2/964, 966, 977**
See application file for complete search history.

(57)

ABSTRACT

A sole for an article of footwear having an insert with a plurality of forefoot support tubes are configured to control the support characteristics of the sole in a forefoot region of the sole. In one embodiment, the forefoot support tubes each include a base, and a wall extending from the base. The wall is formed from a material that has a lower durometer value than the base. In another embodiment, the forefoot support tubes air arranged in a radiating pattern, such that at least two of the forefoot support tubes diverge as they extend toward the lateral side of the insert.

6 Claims, 18 Drawing Sheets



base 550a-e, and a generally semi-circular wall 570a-e extending upwardly from the base 550a-e and forming a tube. The upwardly extending walls 570a-e may alternatively have a variety of shapes. They may be hollow, as shown, or may be filled with a support material, such as EVA. In another embodiment, the bases may have different shapes, for example, they may be semi-circular to form round tubes. In yet another embodiment, the walls may extend downwardly from the base, or both upwardly and downwardly from the base.

The bases 550a-e of each forefoot support tube 510 may be integrally connected to each other and to the arch portion 420, for example as a forefoot extension of tube insert 160. As shown, the bases 550a-e are integrally connected to each other to form a web 590 extending from the arch portion 420. The web 590 is cut off just in front of the forward most forefoot support tube 510a. It may, however, be designed to extend through essentially any portion of the forefoot region or over the entire forefoot region, if desired. Alternatively, one or more of the bases and forefoot support tubes may be separate sections. As shown, the web 590 additionally integrally includes a peripheral portion of each of the upwardly extending walls 570a-e. Referring to FIGS. 14 and 16, a first set of loops 610a-e extend upwardly from the web 590 to form a first peripheral portion of the forefoot support tubes 510a-e on the lateral side of the insert 160. A second set of loops 630a-e extend upwardly from the web 590 to form a second peripheral portion of the forefoot support tubes 510a-e on the medial side of the insert 160. The web 590 may additionally define a plurality of flex slots 560 configured to provide flex points. As in the first embodiment, the insert 160 can be attached to the outsole 120 by a variety of conventional methods.

The insert 160, including the forefoot support tubes 510a-e, may be manufactured from a variety of conventional materials, but typically it will be manufactured from a material that is stiffer than the heel wedge 140 and/or midsole (not shown). For example, the insert 160 may be injection molded from TPU, TPR, PVC or other injected polymers. The insert 160 may be manufactured from other materials, such as nylon, rubber, synthetic rubber or silicone, but it is likely that the insert 160 would not be manufactured by injection molding if any of these alternative materials was used. If desired, the insert 160 may be manufactured from a collection of different materials. For example, the arch portion 420 may be manufactured from a stiffer material than the heel portion 400.

Referring now to FIG. 16, in one embodiment, the forefoot support tubes 510a-e are formed from two different materials. The web 590, including base portions 550a-e and the first and second sets of loops 610a-e and 630a-e, are formed from a first material. The upwardly extending walls 570a-e are formed from a second material. In the illustrated embodiment, the upwardly extending walls 570a-e are connected together by an upper web 650, such that they may be formed from a single piece of the second material. As illustrated, all of the insert 160 except for the upwardly extending walls 570a-e is formed from the first material. The second material is typically softer than the first material, such that the forefoot support tubes 510a-e provide the desired level of cushioning and support. In one embodiment, the first material has a durometer value of 85 Shore A, and the second material has a durometer value of 65 Shore A. In another embodiment, the first material is approximately 10-30 Shore A points higher than the second material, however, the range may vary, and alternatively the first material may be softer than the second material. If desired, the forefoot support tubes may be formed from more than two materials, for example, the walls 570a-e

may each be formed from a different material with a different durometer value in order to even more closely control the support and cushioning characteristics of the insert 160. The second material may be attached to the first material by a variety of conventional methods, such as cement, adhesive, or bonding by heating one or both of the materials.

Although not shown, in this embodiment, the midsole is similar to the midsole 18 of the first embodiment. The under-surface of the midsole may be contoured to compliment the shape of the outsole 120, heel wedge 140 and insert 160—including the forefoot support tubes 510a-e, as in the first embodiment, such the midsole is contoured to define a plurality of support tube recesses that are adapted to closely receive the support tubes 460a-j and the forefoot support tubes 510a-e of the insert 160. The midsole may include a plug, similar to the plug 62 of the first embodiment. The heel wedge 140 is also similar to the heel wedge of the first embodiment, and will not be described in detail. As in the first embodiment, the heel wedge may include tube recesses 360, and a central opening 800.

The above description identifies certain approximate durometer values for the various components of the sole 10 of the illustrated embodiment. The recited values are merely exemplary and the present invention is not limited to sole constructions with the specific recited durometer values. To the contrary, the present invention should be broadly interpreted to extend to sole components having different compressibility values.

The above description is that of the current embodiments of the invention. Various alterations and changes can be made and without departing from the spirit and broader aspects of the invention as defined in the appended claims, which are to be interpreted in accordance with the principles of patent law including the doctrine of equivalents. Any reference to claim elements in the singular, for example, using the articles "a," "an," "the" or "said," is not to be construed as limiting the element to the singular.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An insert for an article of footwear comprising:
 - a plurality of resilient compressible front support tubes, each of said front support tubes defining a base, and a wall extending from said base, wherein said base is formed from a first material, and at least a portion of said wall is formed from a second material softer than said first material, wherein said insert includes an arch portion and a heel portion, said heel portion including a plurality of resilient compressible rear support tubes, each of said rear support tubes defining an internal void; and a plurality of webs, each of said webs being disposed within a corresponding one of said rear support tubes and extending at an orientation, said orientation of each of said webs being pre-selected to provide said insert with a support profile, wherein said arch portion defines a slot to receive a gaiter strap.
2. An article of footwear, the article of footwear having a forefoot region, the a lateral side and a medial side, the article of footwear comprising:
 - a two-component insert permanently affixed in the article of footwear, said insert including a plurality of resilient compressive front support tubes, said front support tubes positioned in the forefoot region of the article of footwear and extending laterally across at least a portion of said insert, at least two of said front support tubes positioned in a radiating arrangement such that said at least two of said front support tubes diverge as they extend toward the lateral side of said insert, each said support

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tube including a base comprised of a first material and a wall extending from the base and formed from a second material, said second material being softer than said first material;
a cushioned midsole disposed above said insert; and
an outsole disposed below said insert and forming a wear resistant, ground engaging surface of the article of footwear, wherein at least a portion of said outsole is directly attached to said insert opposite said front support tubes.
3. The article of footwear of claim 2 wherein said first material has a Shore A durometer value that is approximately 10-30 points higher than the Shore A durometer value of said second material.
4. An insert for an article of footwear comprising:
a forefoot portion, said forefoot portion including a plurality of front support tubes, each of said front support tubes including a base and a wall extending from said base, said base comprised of a first material, said wall comprised of a second material, said first material having a higher durometer value than said second material, said front support tubes extending laterally across said forefoot portion and arranged in a generally radiating

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pattern, such that at least two of said front support tubes diverge as they extend towards the lateral side of said insert;
an arch portion integral with said forefoot portion, said arch portion defining a slot for receiving the strap of a gaiter; and
a heel portion, said heel portion including a plurality of rear support tubes, each of said rear support tubes including an internal web extending at an orientation, said orientation of at least one web varying from said orientation of at least one other web.
5. The insert of claim 4 wherein said plurality of rear support tubes includes a plurality of medial rear support tubes disposed on a medial side of the insert and a plurality of lateral rear support tubes disposed on a lateral side of the insert.
6. The insert of claim 4 further comprising:
an outsole; and
a heel wedge disposed above and connected to said outsole at least in said heel region, said insert disposed above and connected to said heel wedge.

* * * * *

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(11) **EP 1 857 003 A3** ✓

(12) **EUROPEAN PATENT APPLICATION**

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(51) Int Cl.:
A43B 13/12 (2006.01) A43B 13/20 (2006.01)

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21.11.2007 Bulletin 2007/47

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(30) Priority: **18.05.2006 US 419043**

(54) **Footwear sole**

(57) A sole for an article of footwear having an insert with a plurality of forefoot support tubes are configured to control the support characteristics of the sole in a forefoot region of the sole. In one embodiment, the forefoot support tubes each include a base, and a wall extending

from the base. The wall is formed from a material that has a lower durometer value than the base. In another embodiment, the forefoot support tubes are arranged in a radiating pattern, such that at least two of the forefoot support tubes diverge as they extend toward the lateral side of the insert.

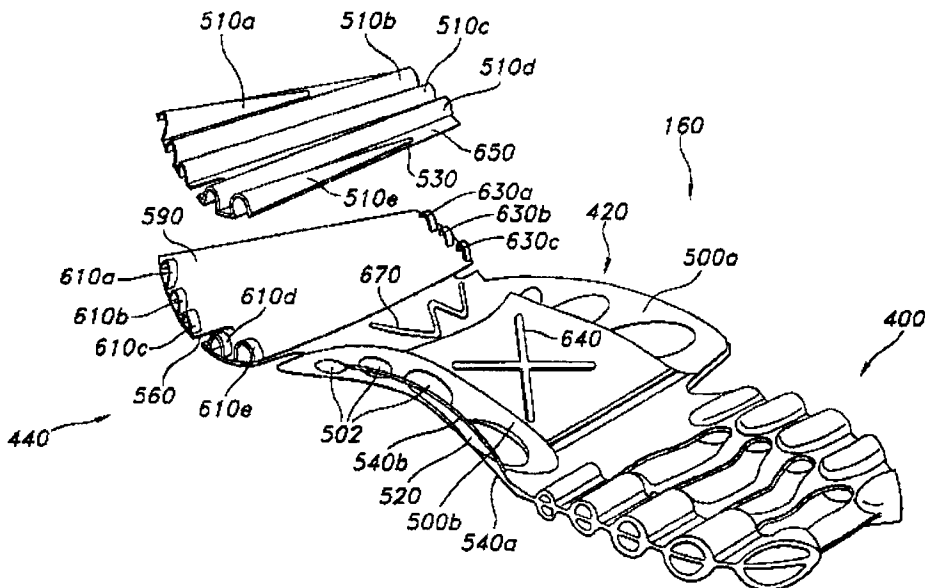


FIG. 16

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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 25 2006

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 4 782 603 A (BROWN STEPHEN C [US]) 8 November 1988 (1988-11-08) * claim 1; figure 1 *	1-10,18	INV. A43B13/12 A43B13/20
X	US 5 005 300 A (DIAZ JUAN A [US] ET AL) 9 April 1991 (1991-04-09)	1-10	
A	* column 3, lines 46-58; claims; figures *	18	
X	DE 101 23 252 A1 (KASDORF BERND [DE]) 8 August 2002 (2002-08-08)	1-10	
A		18	
P,X	EP 1 728 446 A (WOLVERINE WORLD WIDE INC [US]) 6 December 2006 (2006-12-06)	1-10	
P,A	* claims; figures *	18	
A	DE 31 30 046 A1 (SVENSKA TOBAKS AB [SE]) 3 March 1983 (1983-03-03) * claims; figures *	1-10,18	
			TECHNICAL FIELDS SEARCHED (IPC)
			A43B
-The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 26 September 2007	Examiner Claudel, Benoît
CATEGORY OF CITED DOCUMENTS X: particularly relevant if taken alone Y: particularly relevant if combined with another document of the same category A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: earlier patent document, but published on, or after the filing date D: document cited in the application L: document cited for other reasons &: member of the same patent family, corresponding document			

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EPO FORM 1508 03 02 (P04031)

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European Patent
Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 07 25 2006



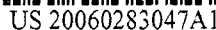
The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-10, 18

an insert with a wall

2. claims: 11-17

an insert with diverging tubes



(12) **Patent Application Publication**
Schoenborn et al.

(43) **Pub. Date:** Dec. 21, 2006

(54) FOOTWEAR SOLE

(52) U.S. Cl. 36/28; 36/29

(75) Inventors: **Mary L. Schoenborn**, Rockford, MI (US); **Donald R. Reardon**, Portland, OR (US)

(57) **ABSTRACT**

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(73) Assignee: **WOLVERINE WORLD WIDE, INC.**,
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(21) Appl. No.: 11/465,281

(22) Filed: **Aug. 17, 2006**

Related U.S. Application Data

(63) Continuation of application No. 11/143,063, filed on Jun. 2, 2005.

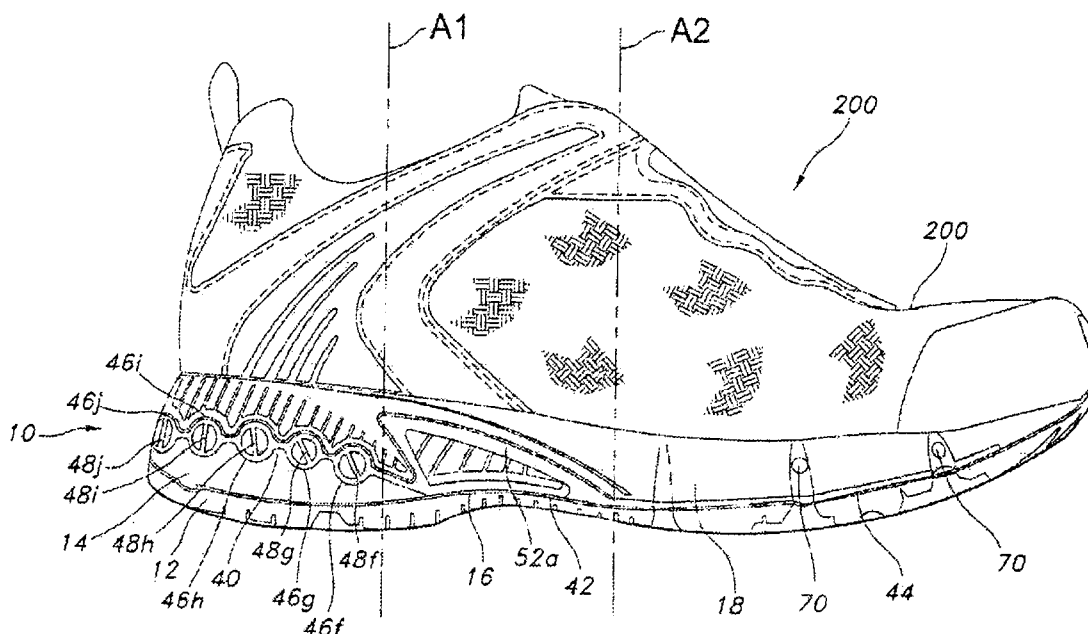
Publication Classification

(51) Int. Cl.

A43B 13/18 (2006.01)

A43B 13/20 (2006.01)

A sole for an article of footwear having an insert that includes a slot for receiving a gaiter strap. In one embodiment, the insert includes a plurality of support tubes that include internal webs configured to control the support characteristics of each support tube. In one embodiment, a first plurality of support tubes is disposed along the medial side of the sole in the heel region and a second plurality of support tubes is disposed along the lateral side of the sole in the heel region. The insert may include an arch portion that extends through and provides support to the arch region of the sole. The arch portion may define a slot to receive a gaiter strap. The insert may further include a forefoot extension that extends forwardly from the arch along the medial side of the sole. In one embodiment, the sole may include a heel wedge disposed below the insert in the heel region such that the support tubes are supported upon a relatively resilient material. In one embodiment, the insert may include struts that interconnect the medial and lateral support tubes.





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(12) **United States Patent**
Schoenborn et al.

(10) **Patent No.:** **US 7,395,613 B2**
(45) **Date of Patent:** ***Jul. 8, 2008**

(54) **FOOTWEAR SOLE**

(56)

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(73) **Assignee:** **Wolverine World Wide, Inc.**, Rockford, MI (US)

(*) **Notice:** Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

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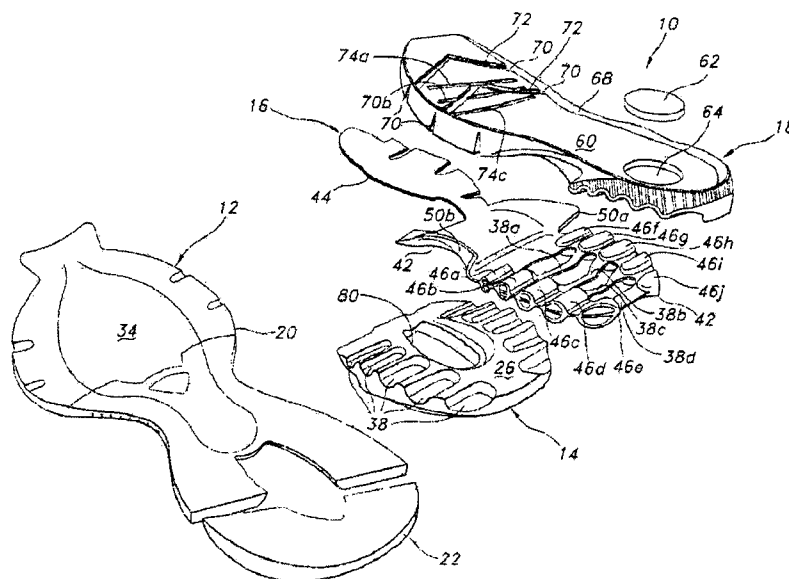
(58) **Field of Classification Search** **D2/977:**
36/27, 28, 29, 31, 37, 78, 3 B, 25 R, 35 B,
36/2 A, 2 B, 2 R, 1.5, 72 R, 72 A, 131, 96
See application file for complete search history.

(57)

ABSTRACT

A sole for an article of footwear having an insert that includes a slot for receiving a gaiter strap. In one embodiment, the insert includes a plurality of support tubes that include internal webs configured to control the support characteristics of each support tube. In one embodiment, a first plurality of support tubes is disposed along the medial side of the sole in the heel region and a second plurality of support tubes is disposed along the lateral side of the sole in the heel region. The insert may include an arch portion that extends through and provides support to the arch portion of the sole. The arch portion may define a slot to receive a gaiter strap. The insert may further include a forefoot extension that extends forwardly from the arch along the medial side of the sole. In one embodiment, the sole may include a heel wedge disposed below the insert in the heel region such that the support tubes are supported upon a relatively resilient material. In one embodiment, the insert may include struts that interconnect the medial and lateral support tubes.

16 Claims, 13 Drawing Sheets





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(30) Priority: 02.06.2005 US 143063

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Rockford, Michigan 49351 (US)

(54) Footwear sole (trailspring II dual)

(57) A sole (10) for an article of footwear having an insert (16) with a plurality of support tubes (46a-j) that include internal webs configured to control the support characteristics of each support tube. In one embodiment, a first plurality of support tubes (46f-j) is disposed along the medial side of the sole (10) in the heel region and a second plurality of support tubes (46a-e) is disposed along the lateral side of the sole in the heel region. The insert (16) may include an arch portion (42) that extends through and provides support to the arch region of the

sole (10). The arch portion (42) may define a slot (52) to receive a gaiter strap. The insert (16) may further include a forefoot extension (44) that extends forwardly from the arch along the medial side of the sole (10). In one embodiment, the sole (10) may include a heel wedge (14) disposed below the insert (16) in the heel region such that the support tubes (46a-j) are supported upon a relatively resilient material. In one embodiment, the insert (16) may include struts (38a-d) that interconnect the medial (46f-j) and lateral (46a-e) support tubes.

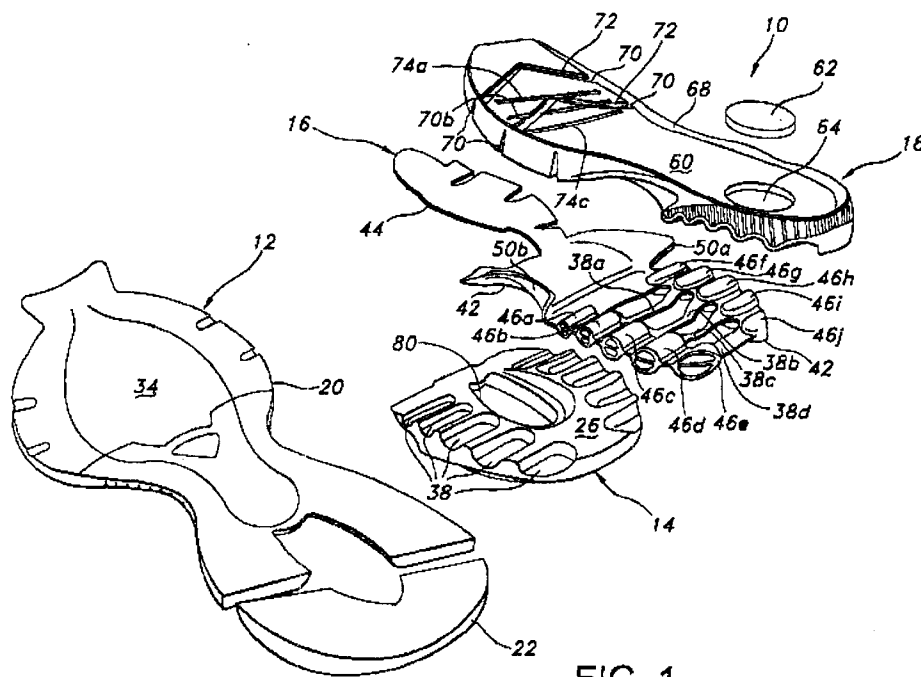


FIG. 1

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European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 25 1336

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			TECHNICAL FIELDS SEARCHED (IPC)
			A43B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		25 July 2006	Cianci, S
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document	

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(12)

EUROPEAN PATENT APPLICATION

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(84) Designated Contracting States: AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR Designated Extension States: AL BA HR MK YU (30) Priority: 02.06.2005 US 143063 (71) Applicant: Wolverine World Wide, Inc. Rockford, Michigan 49351 (US)	(72) Inventors: • Schoenborn, Mary L. Rockford, Michigan 49341 (US) • Reardon, Donald R. Portland, Oregon 97232 (US) (74) Representative: Roberts, Gwilym Vaughan et al Kilburn & Strode 20 Red Lion Street London WC1R 4PJ (GB)
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(54)

Footwear sole (trailspring II dual)

(57) A sole (10) for an article of footwear having an insert (16) with a plurality of support tubes (46a-j) that include internal webs configured to control the support characteristics of each support tube. In one embodiment, a first plurality of support tubes (46f-j) is disposed along the medial side of the sole (10) in the heel region and a second plurality of support tubes (46a-e) is disposed along the lateral side of the sole in the heel region. The insert (16) may include an arch portion (42) that extends through and provides support to the arch region of the sole (10). The arch portion (42) may define a slot (52) to receive a gaiter strap. The insert (16) may further include a forefoot extension (44) that extends forwardly from the arch along the medial side of the sole (10). In one embodiment, the sole (10) may include a heel wedge (14) disposed below the insert (16) in the heel region such that the support tubes (46a-j) are supported upon a relatively resilient material. In one embodiment, the insert (16) may include struts (38a-d) that interconnect the medial (46j-f) and lateral (46a-e) support tubes.

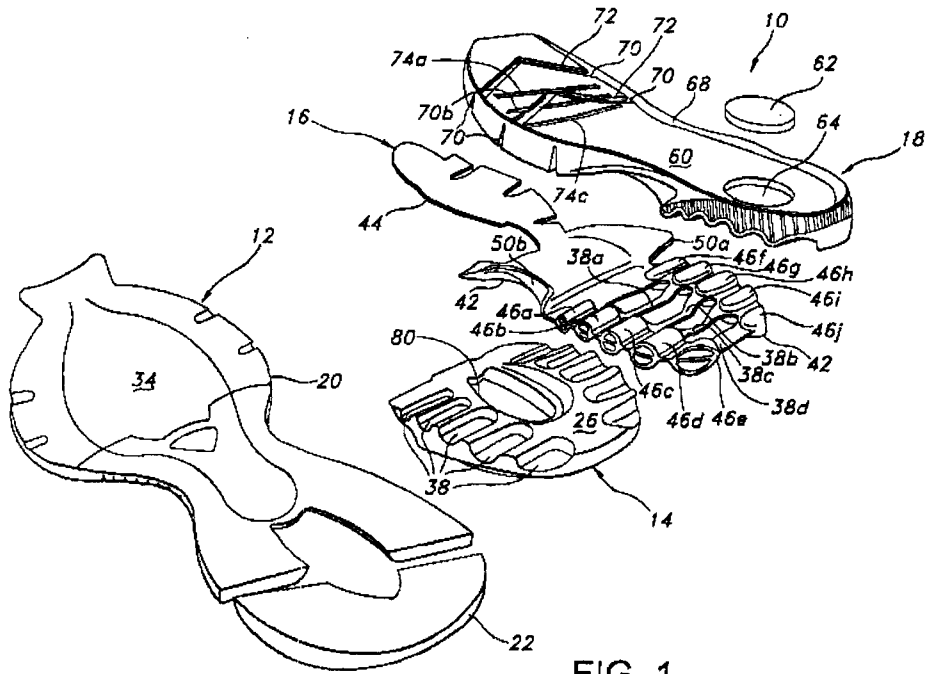


FIG. 1

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DETAILED ACTION

Double Patenting

1. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

2. Claims 1-28 are finally provisionally rejected on the ground of nonstatutory double patenting over claims 29-51 of copending Application No. 11/465,281. This is a provisional double patenting rejection since the conflicting claims have not yet been patented.

The subject matter claimed in the instant application is fully disclosed in the referenced copending application and would be covered by any patent granted on that copending application since the referenced copending application and the instant application are claiming common subject matter, as follows: an article of footwear comprising an upper; and a sole interconnected with said upper, said sole including a

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midsole, a heel wedge and an insert, said insert disposed between the upper and the sole and comprising a plurality of resilient compressible support tubes, each of said support tubes defining an internal void; a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with a support profile; said insert also includes a heel portion and an arch portion, said plurality of support tubes being disposed in said heel portion, said arch portion being integral with said heel portion; and said arch portion defining a slot capable of receiving a gaiter strap.

Furthermore, there is no apparent reason why applicant would be prevented from presenting claims corresponding to those of the instant application in the other copending application. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1-11 and 14-15 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Inohara (US 4,506,461) in view of Lucas. Inohara discloses an article of footwear comprising; an upper (B); an outsole (C); an insert (interlayer body 3) disposed above the outsole; a midsole (interlayer sole 2) disposed above and connected to said insert; and wherein insert includes a plurality of medial support tubes disposed along a medial side of the sole and a plurality of lateral support tubes disposed along a lateral side of the sole, said medial tubes being spaced apart from said lateral support tubes to define a heel centering region there between. See Figures 1 and 8-10 embodiments and column 4, lines 25-34. Inohara does not appear to disclose a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with a support profile. Lucas discloses an article of footwear having an insert with a plurality of support tubes and a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with better cushioning characteristics. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes of Inohara as taught by Lucas to provide better cushioning

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characteristic to the insert. "A combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results."

KSR Int'l v. Teleflex Inc., 127 S.Ct. 1731, 82 USPQ2d at 1396. "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." *Id.*

With respect to claims 8 and 9, see Figure 10 embodiments.

With respect to claim 10, it would have been an obvious matter of design choice to modify the shape of the struts, since such a modification would have involved a mere change in shape of a component and yield only predictable results. "[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill." *KSR Int'l v. Teleflex Inc.*, 127 S.Ct. 1740, 82 USPQ2d 1396 (2007). A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

With respect to claims 1, 14 and 15, it would have been an obvious matter of design choice to modify the shape and angle and orientation of the webs, since such a modification would have involved a mere change in shape of a component and yield only predictable results. "[I]f a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond

that person's skill." *KSR Int'l v. Teleflex Inc.*, 127 S.Ct. 1740, 82 USPQ2d 1396 (2007).

"When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability."

A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

6. Claims 16-28 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over the Inohara-Lucas references as applied to claims 1-9 and 11 above, and further in view of Tadin. Inohara-Lucas as modified above discloses all the limitations of the claims except for a heel wedge disposed underneath the insert. Tadin discloses a footwear customizing kits to include one or more insole adjustment devices adapted to be used with the insole for adjusting positioning of the foot within the footwear. At least one insole adjustment device is an intrinsic or extrinsic insole adjustment device comprising a medial half-heel wedge, a lateral half-heel wedge, a full-width heel wedge. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a heel wedge underneath the modified insert of Inohara as taught by Tadin adapted to be used with the insole for adjusting positioning of the foot within the foot wear.

With respect to claims 19 and 20, it would have been an obvious matter of design choice to modify the shape, angle and orientation of the webs, since such a modification would have involved a mere change in shape of a component and yield only predictable results. "When a work is available in one field of endeavor, design incentives and other

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market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

With respect to claim 22, it would have been an obvious matter of design choice to modify the shape of the struts, since such a modification would have involved a mere change in shape of a component and yield only predictable results. "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

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With respect to claim 25, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a forefoot extension to the insert of turner and yield only predictable results such as to provide added cushioning to the forefoot area of the wearer .

7. Claims 1 and 11-13 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al. (US 6,782,641) in view of Lucas. Turner discloses an article of footwear comprising an upper (111); and a sole (112) interconnected with said upper, said sole including a midsole (120), a heel wedge (lower support platform 123) and an insert (bladder 122), said insert disposed between the upper and the sole and comprising a plurality of resilient compressible support tubes (141, see column 6, lines

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45-54 and Figure 11 embodiment), each of said support tubes defining an internal void; said insert includes a heel portion and an arch portion (see Figure 11 and where the area that arrow with reference number 116 is pointing to), said plurality of support tubes being disposed in said heel portion, said arch portion being integral with said heel portion; and said arch portion defining a slot (aperture 34) capable of receiving a gaiter strap. See Figures 6, 9 and 11 embodiments. Turner does not appear to disclose a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with a support profile. Lucas discloses an article of footwear having an insert with a plurality of support tubes and a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with better cushioning characteristics. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes of Turner as taught by Lucas to provide better cushioning characteristic to the insert.

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With respect to claim 13, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a forefoot extension to the insert of turner to provide added cushioning to the forefoot area of the wearer.

With respect to claim 1, it would have been an obvious matter of design choice to modify the shape, angle and orientation of the webs, since such a modification would

have involved a mere change in shape of a component and yield only predictable results. "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

8. Claims 1, 2, 6, 7, 14-20, 23-24 and 26-28 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Sang do (US 5,224,277). Sang Do discloses an article of footwear comprising an upper (sport shoe); and a sole (see Figure 1 embodiment) interconnected with said upper, said sole including a midsole (1), a heel wedge (flanges 15 and 15') and an insert (horseshoe-shaped shock absorbing heel member 14), said insert disposed between the upper and the sole and comprising a plurality of resilient compressible support tubes (see Figures 13A-19A), each of said support tubes defining an internal void; and a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with a support profile.

With respect to shape, angle and orientation of the webs, Sang do as shown in Figures 13A-19A discloses a variety of different webs that can be disposed within the support tubes, it would have been an obvious matter of design choice to modify the shape, angle and orientation of the webs, since such a modification would have involved a mere change in shape of a component and yield only predictable results.

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"When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability."

A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

9. Claims 1-5 are finally rejected under 35 U.S.C. 103(a) as being unpatentable over Lucas et al. (US 7,013,582). Lucas discloses an article of footwear comprising an upper (39); and a sole (50) interconnected with said upper, said sole including a midsole (forward deformation foam elements 20), a heel wedge (aft deformation foam elements) and an insert (deformation elements 1), said insert disposed between the upper and the sole and comprising a plurality of resilient compressible support tubes, each of said support tubes defining an internal void; and a plurality of webs, each of said webs being disposed within a corresponding one of said support tubes and extending at an orientation, said orientation of each said webs being pre-selected to provide said insert with a support profile. See Figures 7 and 8 embodiments.

With respect to shape, angle and orientation of the webs, it would have been an obvious matter of design choice to modify the shape, angle and orientation of the webs, since such a modification would have involved a mere change in shape of a component and yield only predictable results. "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." A change in shape is generally recognized

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as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Response to Arguments

10. Applicant's arguments filed 10/08/2007 have been fully considered but they are not persuasive. With respect to shape, angle and orientation of the webs, it would have been an obvious matter of design choice to modify the shape, angle and orientation of the webs, since such a modification would have involved a mere change in shape of a component and yield only predictable results. "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." A change in shape is generally recognized as being within the level of ordinary skill in the art. *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

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Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

United States Patent [19]

Inohara

[11] Patent Number: 4,506,461

[45] Date of Patent: * Mar. 26, 1985

- [54] SPORT SHOE SOLE
- [75] Inventor: Masanobu Inohara, Akashi, Japan
- [73] Assignee: Asics Corporation, Kobe, Japan
- [*] Notice: The portion of the term of this patent subsequent to Dec. 2, 1997 has been disclaimed.

- [21] Appl. No.: 383,007
- [22] Filed: May 28, 1982

Related U.S. Application Data

- [62] Division of Ser. No. 174,894, Aug. 4, 1980, abandoned, which is a division of Ser. No. 896,477, Apr. 14, 1978, Pat. No. 4,236,326.
- [51] Int. Cl.³ A43B 13/20; A43B 21/28
- [52] U.S. Cl. 36/29; 36/3 B; 36/35 B
- [58] Field of Search 36/29, 28, 3 B, 3 R, 36/35 B, 32 R, 30 R

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Primary Examiner—James Kee Chi

[57] ABSTRACT

A sport shoe sole having a ground sole rigid and of excellent abrasion resistance and an elastic interlayer body bonded to the ground sole, in which the interlayer body is provided at its heel portion with an air inclusion means such as grooves and apertures that open at least to one side of the interlayer body.

2 Claims, 13 Drawing Figures

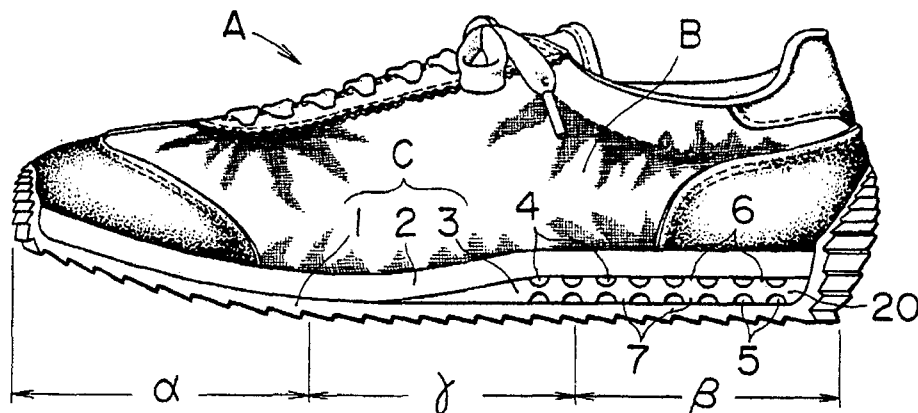


FIG. 7

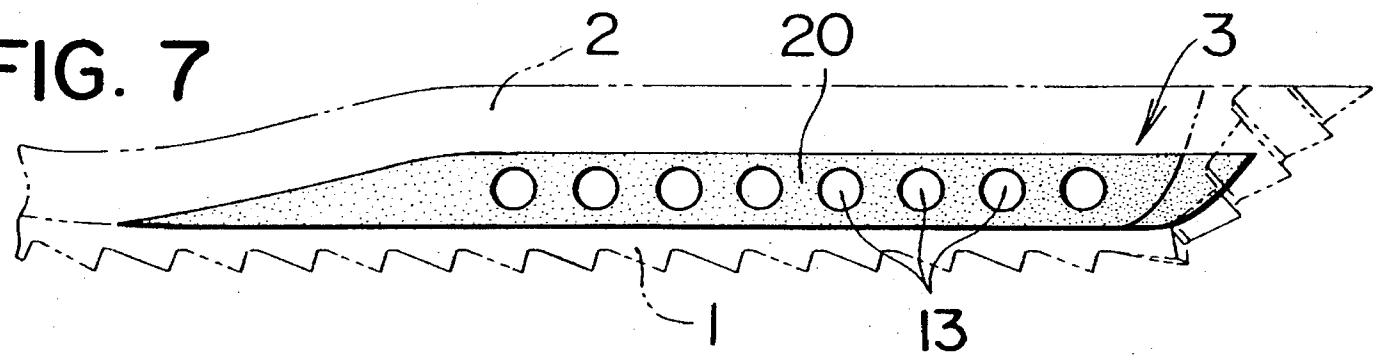
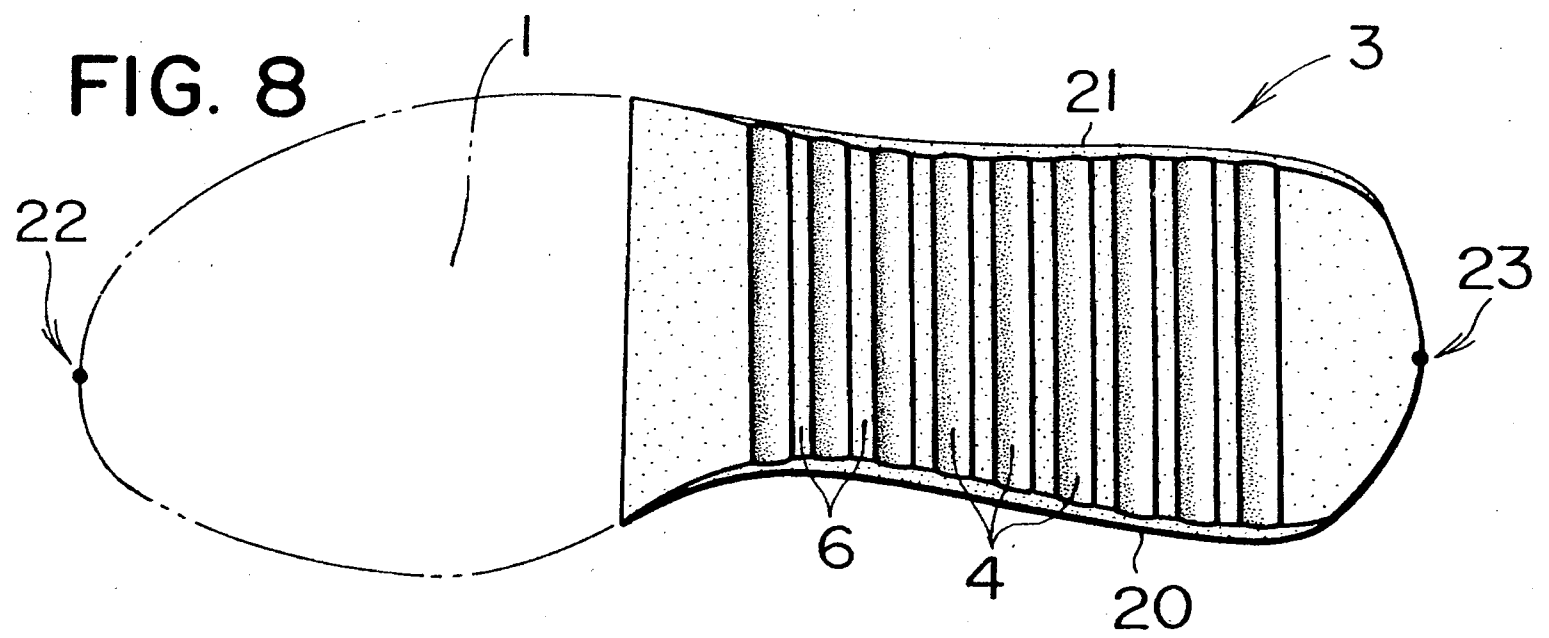


FIG. 8



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FIG. 9

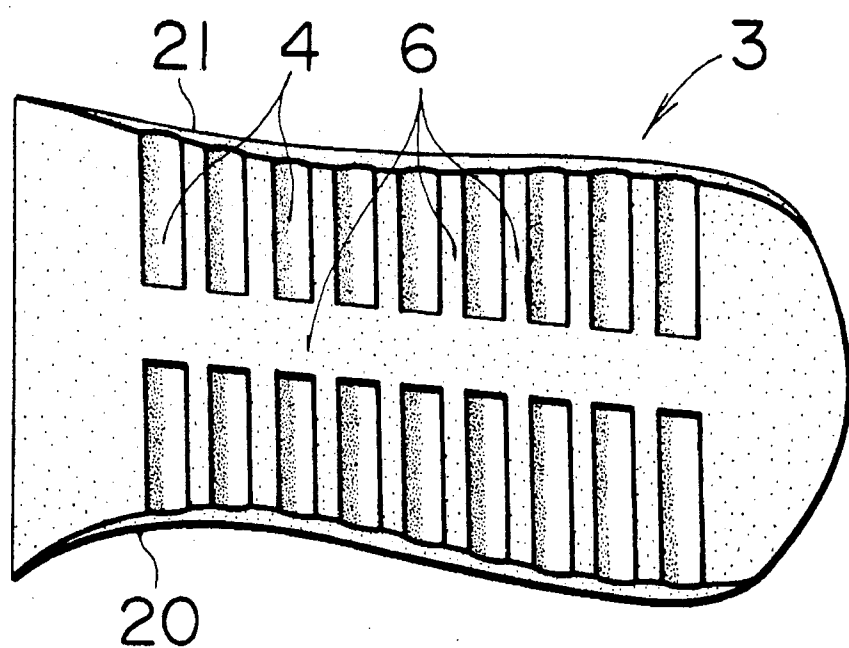
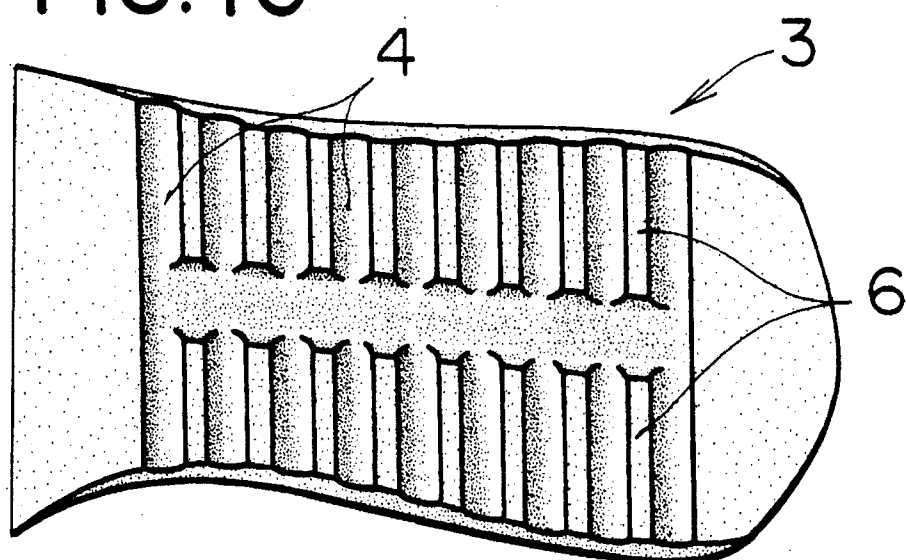


FIG. 10



always be uniform and it may either be smaller or greater as compared with that of the interlayer sole 2, it is desired that the thickness of the interlayer body 3 and that of the interlayer sole 2 are identical. The shoe sole C is designed in such a configuration as well-conforming the shape of a runner's foot and suiting to running movements.

A plurality of air inclusion grooves 4 and 5 as an air inclusion means of this invention are formed at the upper and the lower surfaces of the interlayer body 3 respectively. Each of the grooves 4 and 5 opens at least to one side of the interlayer body 3 and has a semi-circular shape in the side view (that is, in cross section) and a linear shape in the plan view as shown in FIG. 8.

The side of the shoe sole of this invention referred to herein is defined as showing each of the right and the left peripheral faces of the shoe sole obtained by dividing the shoe sole with a line connecting the top end of the toe and the rear end of the heel. Namely, right and left peripheral faces 20 and 21 formed by dividing the sole with a line connecting the points 22 and 23 in FIG. 8 constitute the both sides of the shoe sole.

The grooves 4 and 5 are arranged at the positions alternating to each other and the projections 6, 7 between the grooves are bonded respectively to the interlayer sole 2 and the ground sole 1 by way of adhesives. The grooves 4 and 5 form air inclusion portions for including air between the interlayer body 3 and the interlayer sole 2 and between the interlayer body 3 and the ground sole 1. The air inclusion portions of this invention are different from the foregoing air inclusion layer of conventional shoes in which air is tightly confined and communicate to the external atmosphere. Namely, the air inclusion portions open externally at each of the sides 20 and 21 of the interlayer body 3.

Thus, air from the outside of the sole is always present in each of the grooves 4 and 5 formed in the interlayer body 3, which provides an air resilience cooperating with the sponge resilience obtained from the interlayer sole 2 and the interlayer body 3. The synergistic effect between the sponge resilience and the air resilience can moderate the rebounding resilience acted upon from the surface of the ground and the like against the landing pressure resulted by the moving action of a racer, which amounts 3 to 6 times as much as the body weight of the racer. Since the air included in each of the above grooves 4 and 5 is released externally upon compression of the interlayer body 3, no destruction occurs as in a closed type air inclusion layer in the sole of conventional sport shoes. Each of the grooves 4 and 5 of the interlayer body 3 from which air has once been released is re-filled with air spontaneously. Repeating exhaustion and re-filling of air from and into the grooves enable to attain the intended purpose of moderating the compression load with long lasting effect. Moreover, since the weight of the wedged shoe sole 3 is reduced by so much as forming the grooves 4 and 5, the most important requirement for the sport shoes, that is, weight reduction can be attained as well.

The air inclusion grooves to be formed in the interlayer body 3 can be constituted, for example, as shown in FIG. 2 in which the grooves 4 and 5 are displaced laterally from each other, as shown in FIG. 3 in which only the grooves 4 are formed or as shown in FIG. 4 in which only the grooves 5 are formed. The side (cross-sectional) shape of the grooves 4 and 5 may not be restricted only to the semi-circular shape but can be

formed in generally full circular shape or, as shown in FIG. 5, in a square shape.

Various shapes, in plan, are applicable to the air inclusion grooves 4 and 5 of the interlayer body 3 in addition to the shape of through grooves extended to both side ends 20 and 21 of the interlayer body 3 as shown in FIG. 8 and they include those grooves extended from each of the sides 20 and 21 of the interlayer body 3 before the center thereof, that is, the grooves disconnected at the center of the interlayer body 3 as shown in FIG. 9, as well as those grooves communicating to each other at the center of the interlayer body 3 as shown in FIG. 9.

It is thus necessary for the air inclusion grooves in the interlayer body 3 to communicate and open externally while leaving sufficient projection between the grooves to support the load which amounts to 3 to 6 times as much as the body weight of the racer.

FIG. 6 and FIG. 7 show embodiments in which a plurality of apertures 7 are formed between the upper and the lower surfaces of the interlayer body 3 as the air inclusion means. The apertures 13, like as the grooves 4, open at least to one side 20 and 21 of the interlayer body 3 and formed in parallel with the upper or the lower surface of the interlayer body 3.

These apertures 13 can be formed like the grooves shown in FIG. 8 as through holes passing between both sides 20 and 21 of the interlayer body, like the grooves shown in FIG. 9 as the holes disconnected at the center of the interlayer body or like the grooves shown in FIG. 10 as the holes communicated to each other at the center of the interlayer body. The apertures may be formed in various sections such as a hexagonal shape as shown in FIG. 9 or other polygonal shapes and a circular shape as shown in FIG. 7.

Other embodiments of the interlayer body 3 are shown in FIGS. 11 and 12. The air inclusion means provided to the interlayer body 3 is, as shown in FIGS. 11 and 12, in the form of honeycomb shape provided with groove. In the interlayer body 3 shown in FIG. 11, arrangement of the groove 8 and the projections 9 is reversed to that of the closed type air inclusion layer in the conventional shoes. Specifically, closed circular air inclusion portions in the conventional shoes are replaced with circular projections 9 and the projections in the conventional shoes are replaced with groove 8 in this invention, which open to the atmosphere outside of the interlayer body 3.

In the interlayer body shown in FIG. 12, the circular projections 9 of the interlayer body shown in FIG. 11 are replaced with hexagonal projections 10 and, as apparent from the foregoing, the projections may not always be restricted to circular or hexagonal shape but in any other forms.

It will be apparent from the foregoing that the air inclusion means in the interlayer body according to this invention for use with the soles of sports shoes is not restricted to the embodiment shown in FIG. 1 but can take various other shapes. Each type of the interlayer body of this invention shows elastic deformation within such a range as causing no destruction to its air inclusion means when applied with a compression load from a racer upon movement which is about 3 to 6 times as much as his body weight. The shoe sole having the interlayer body 3 according to this invention can moderate the above compression load effectively by the resilience of the interlayer body per se and the resilience of air which is resulted upon releasing of air from the grooves or the apertures. Air flown out from the

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United States Patent [19]
Brown

[11] Patent Number: 4,782,603
[45] Date of Patent: Nov. 8, 1988

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[54] MIDSOLE

[75] Inventor: Stephen C. Brown, San Francisco, Calif.

[73] Assignee: The Summa Group Limited, San Francisco, Calif.

[21] Appl. No.: 895,766

[22] Filed: Aug. 12, 1986

[51] Int. Cl.⁴ A43B 13/20; A43B 13/18

[52] U.S. Cl. 36/29; 36/28

[58] Field of Search 36/28, 29, 30 R, 25 R, 36/31, 27, 102, 103, 107, 108, 114, 3 B, 92

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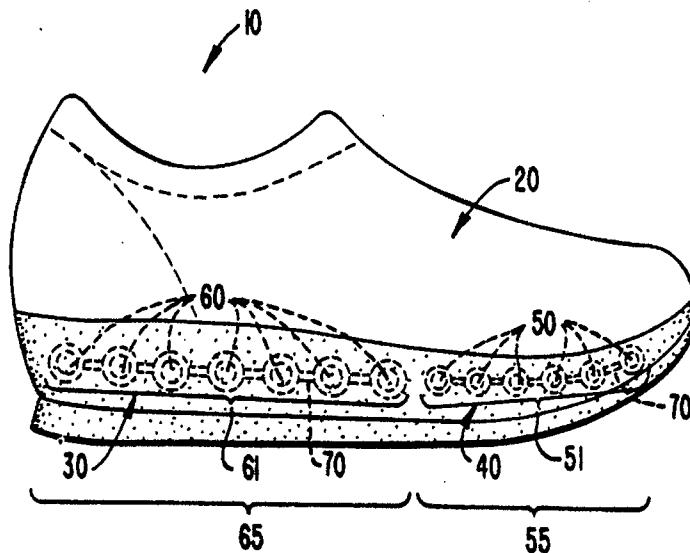
Primary Examiner—Steven N. Meyers

Attorney, Agent, or Firm—Townsend and Townsend

[57] ABSTRACT

A molded midsole encapsulating a series of parallel, spaced-apart tubes for shock absorption. The tubes are disposed perpendicular to the longitudinal axis of the sole. The tubes are constructed from a material somewhat more rigid than the surrounding molded material. The tubes may be arranged in the forefoot region, or in the heel region, or throughout the longitudinal span of the midsole. Transverse strips of tubing material may be used to space apart and join tubes to fabricate separate tube assemblies which are inserted directly in the midsole mold.

7 Claims, 1 Drawing Sheet



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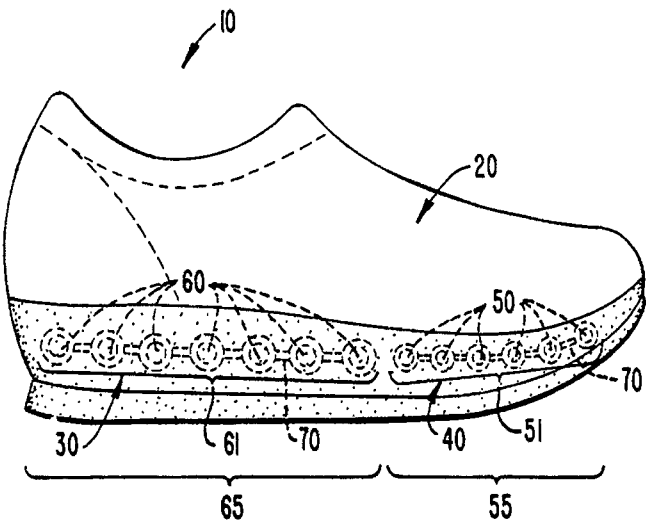


FIG. 1.

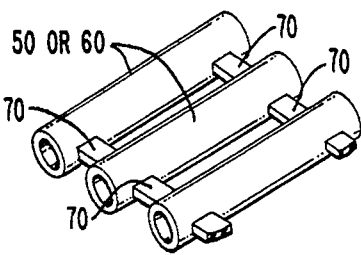


FIG. 3.

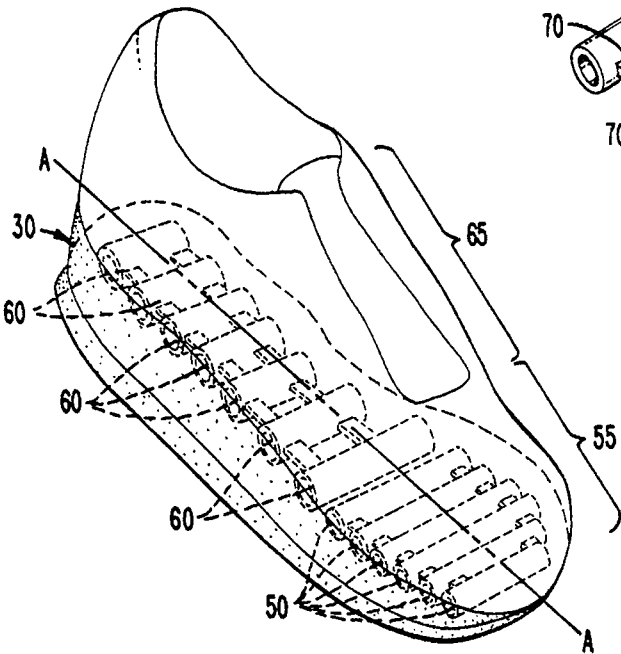


FIG. 2.

MIDSOLE

BACKGROUND OF THE INVENTION

The present invention relates to an improved shoe midsole.

A number of midsole and outsole designs have been proposed to improve the shock absorption of shoes, especially athletic shoes. Various shaped outsoles, which are the sole portions which actually contact the ground, have been proposed to provide shock absorption features. Some designs have also proposed embedding liquid filled vessels in the midsole, which is the portion of the shoe between the upper of the shoe and the outsole. Other designs have proposed inserting removable cylinders of varying densities into the midsole to provide an adjustable level of shock absorption.

SUMMARY OF THE INVENTION

The present invention is drawn to a midsole which has a forefoot region and a heel region, and which is molded from a flexible, resilient material. The midsole has a sole axis which extends from the heel of the shoe to the toe. A plurality of tubes, are embedded in the molded midsole. The tubes may be spaced in the forefoot region alone, the heel region alone or throughout the midsole, depending on the application for which the shoe is intended. The tubes each have a tube axis, and are arranged in parallel, spaced apart relation along the midsole with their tube axes generally perpendicular to the sole axis.

One of the many advantages of the invention is its simplicity of construction. It is inexpensive to manufacture, yet equally as effective a shock absorption system as the more complicated structures.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side elevational view of a shoe midsole embodying the present invention; and

FIG. 2 is an isometric view of a shoe with the tube arrangement of the present invention.

FIG. 3 is a detailed isometric view of transverse strips between tubes.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, a simplified schematic of a shoe 10 is shown with an upper 20, a midsole 30, and an outsole 40. The midsole 30 is formed with an assembly 50 of six smaller diameter tubes disposed in the front, or forefoot region 55 of the shoe, and an assembly 60 of seven larger diameter tubes disposed in the rear, or heel region 65 of the shoe.

It is to be understood that the preferred embodiment described herein is directed to a shoe with tube assemblies in both the forefoot region 55 and heel region 65. Certain shoes designed for certain activities would have tube assemblies disposed in either the forefoot region alone or the heel region alone. For instance, for aerobic exercise shoes, the tubes would only be in the forefoot region 55 of the shoe. For running shoes, basketball shoes, walking shoes or tennis shoes, tubes only in heel region 65 would be more appropriate.

Midsole 30 partially comprises a midsole element which is molded from polyurethane, which is the chosen material of construction because it is flexible, moldable and resilient. The midsole is fixedly attached to the upper 20 and outsole 40 in a conventional fashion

known to those skilled in the art. The assemblies 50, 60 are suspended in the mold prior to the injection or introduction of the molten midsole polyurethane material. Tube assemblies 50, 60 are also constructed from nitrile butadiene or another rubber base compound and must be more dense than the material used for the midsole to withstand repeated impact forces.

FIG. 2 is an isometric view of a shoe containing tube assemblies 50 and 60, illustrating the relation of tube assemblies 50, 60 to the longitudinal sole axis represented by the line A—A. Each tube has a tube axis which is generally perpendicular to sole axis A—A. The tube assemblies 50 in the forefoot region 55 must be arranged transverse to the sole axis A—A, since it would detract from the flexibility of the front portion of the shoe if they had a longitudinal arrangement.

Tube assembly 60 in heel region 65 might also be arranged in a longitudinal arrangement since there is little flexure of the sole in the heel region 65. However, the transverse arrangement is preferred in heel region 65 also, since it is easier to suspend tube assemblies 60 during the molding of midsole 30.

To facilitate the manufacture of the midsoles of the present invention, forefoot tube assemblies 50 and heel tube assemblies 60 may be produced as integral units 51 prior to the molding step of the midsole. For instance, the six forefoot tubes of tube assembly 50 shown in FIGS. 1 and 2 could be produced at the same time and connected near their ends by short, transverse strips 70 constructed from the same tube material. The transverse strips 70 also serve to space apart the individual tubes of tube assemblies 50 or 60 a predetermined distance. The assembly of forefoot tubes 50 could then be placed as an integral unit into the forefoot region of the midsole mold during the midsole manufacturing process. A similar method could be used to produce tube assembly tubes 60. The individual tubes ends could be sealed in an additional step. This method of producing tube assemblies would save labor in the molding of the midsole by eliminating the process of cutting individual tubes to length and having to position individual tube segments within the mold.

During vigorous exercise, such as running, tennis or other activities, the heel may be the first portion of the shoe to strike the ground. To absorb the greater impact loads imposed on the heel, a greater number of tubes 60 are spaced along heel region 65. To provide the greater cushioning effect, and also to compensate for the greater thickness of the midsole in heel region 65, larger diameter tubes are used in heel region 65 of the midsole. Smaller diameter tubes are used in forefoot region 55 to dissipate the impact forces away from the foot and leg of the wearer.

The tubes 50, 60 themselves must be constructed from a material which is somewhat more dense than the polyurethane or other resilient material used to mold the remainder of the midsole. Because of the number of impacts which are imparted to the tubes, the tubes must be of sufficient resiliency and strength to resist collapse along their walls. The tubes must resist such impact forces for the lifetime of the shoe in order to provide for continued shock absorption. The tubes 50, 60 should be of sufficient hardness so as to remain in their undeformed state under the weight of the wearer. Tubes 50, 60 should only be deformed under impact loads. The density of the tubing material may be varied according to the application for which the shoe is designed.

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The spacing between individual tubes in heel region 65 and forefoot region 55 determine the flexibility and "give" of the midsole. This spacing is partly defined by strips 70 as shown in the detail of FIG. 3. It has been found that a spacing of between three and four millimeters between tubes is best for athletic shoes. Tubes 60 having an outer diameter of about six millimeters and an inner diameter of about four millimeters have been tested and found to be satisfactory. Tubes 50 having an outer diameter of four to five millimeters and an inner diameter of two to three millimeters have also been found satisfactory.

In constructing the midsole, it has been found that it is preferable to completely encapsulate the tubes 50, 60, rather than leaving the ends exposed along the sides of the shoe. This results in ambient air being trapped within the tubes during the molding process, with the resulting pressure providing an enhanced rigidity to the tubes. Further, encapsulation of the tubes prevents debris from collecting inside of the tubes. Such debris might interfere with the proper deformation of the tubes 50, 60 during loading.

The foregoing is a complete description of the invention. The above is not intended to limit the scope of the invention disclosed herein. For instance, the number or dimensions of the tubes in the detailed description could be altered without departing from the present invention. Other modifications and variations can be made to the disclosed embodiments without departing from the subject of the invention as defined in the following claims.

What is claimed is:

1. A midsole for a shoe, said shoe having a toe, a heel, an upper and an outsole, comprising:
a molded midsole element having embedded within it a forefoot tube assembly and a heel tube assembly; said midsole element being characterized by a sole axis extending from said heel to said toe; and wherein said forefoot tube assembly and said heel tube assembly further comprise a plurality of tubes in parallel arrangement, each tube sealed at both ends, each tube having a longitudinal tube axis, said tubes maintained in a diametrically spaced apart relation by spacing means integrally formed as part of each tube assembly, with said tube axes generally perpendicular to said sole axis, said midsole element sandwiched between said upper and said outsole.
 2. The midsole of claim 1, wherein said tubes are constructed from a material which is more dense than the material from which said forefoot region and said heel region are constructed.
 3. The midsole of claim 1, wherein said tubes in said heel tube assembly have a greater outer diameter than said tubes in said forefoot tube assembly.
 4. The midsole of claim 1, wherein said tubes in said forefoot tube assembly have an outer diameter of four millimeters and an inner diameter of two millimeters.
 5. The midsole of claim 4, wherein said tubes in said forefoot tube assembly are spaced apart three millimeters.
 6. The midsole of claim 1, wherein said tubes in said heel tube assembly have an outer diameter of six millimeters and an inner diameter of four millimeters.
 7. The midsole of claim 6, wherein said tubes in said heel tube assembly are spaced apart three millimeters.
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United States Patent [19]
Diaz et al.

[11] **Patent Number:** 5,005,300
[45] **Date of Patent:** Apr. 9, 1991

1-3

- [54] **TUBULAR CUSHIONING SYSTEM FOR SHOES**
- [75] **Inventors:** Juan A. Diaz, Weymouth; Mark R. Goldston, Newton; Spencer White, Marion; David E. Miller, Carver; Charles P. Legassie, Canton, all of Mass.; Wayne Russell, Wakefield, England; Judith C. Ringel, Milton, Mass.
- [73] **Assignee:** Reebok International Ltd., Stoughton, Mass.
- [21] **Appl. No.:** 492,434
- [22] **Filed:** Mar. 7, 1990

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Primary Examiner—Steven N. Meyers
Attorney, Agent, or Firm—Sterne, Kessler, Goldstein & Fox

ABSTRACT

The present invention utilizes an upper and a midsole which is disposed in a conventional manner below the upper. The midsole includes an elastomeric material and has a number of spaced-apart horizontal tubes extending the width of the midsole which are encapsulated in the elastomeric material. The tubes are hollow and lay side by side in a direction either perpendicular to the longitudinal axis of the shoe, parallel to the axis, or in any other direction functional for foot and shoe mechanics. The elastomeric material has a hardness less than the tubes and fills the space between the tubes. To visualize the midsole, a transparent window may be utilized.

4 Claims, 8 Drawing Sheets

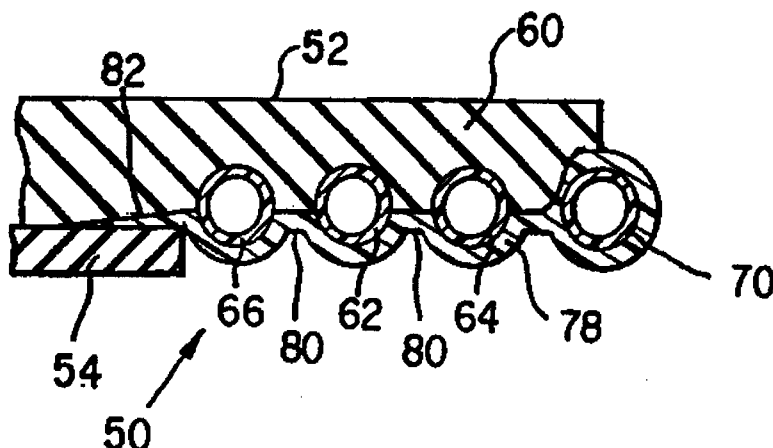
Related U.S. Application Data

- [63] Continuation of Ser. No. 304,615, Feb. 1, 1989, abandoned, which is a continuation-in-part of Ser. No. 70,214, Jul. 6, 1987, abandoned.
- [51] **Int. Cl.³** A43B 13/20; A43B 13/18; A43B 5/00
- [52] **U.S. Cl.** 36/114; 36/28; 36/31
- [58] **Field of Search** 36/29, 28, 3 R, 3 B, 36/30 R, 31, 27, 102, 103, 107, 108, 114, 92, 32 R, 25 R, 35 R, 37, 136

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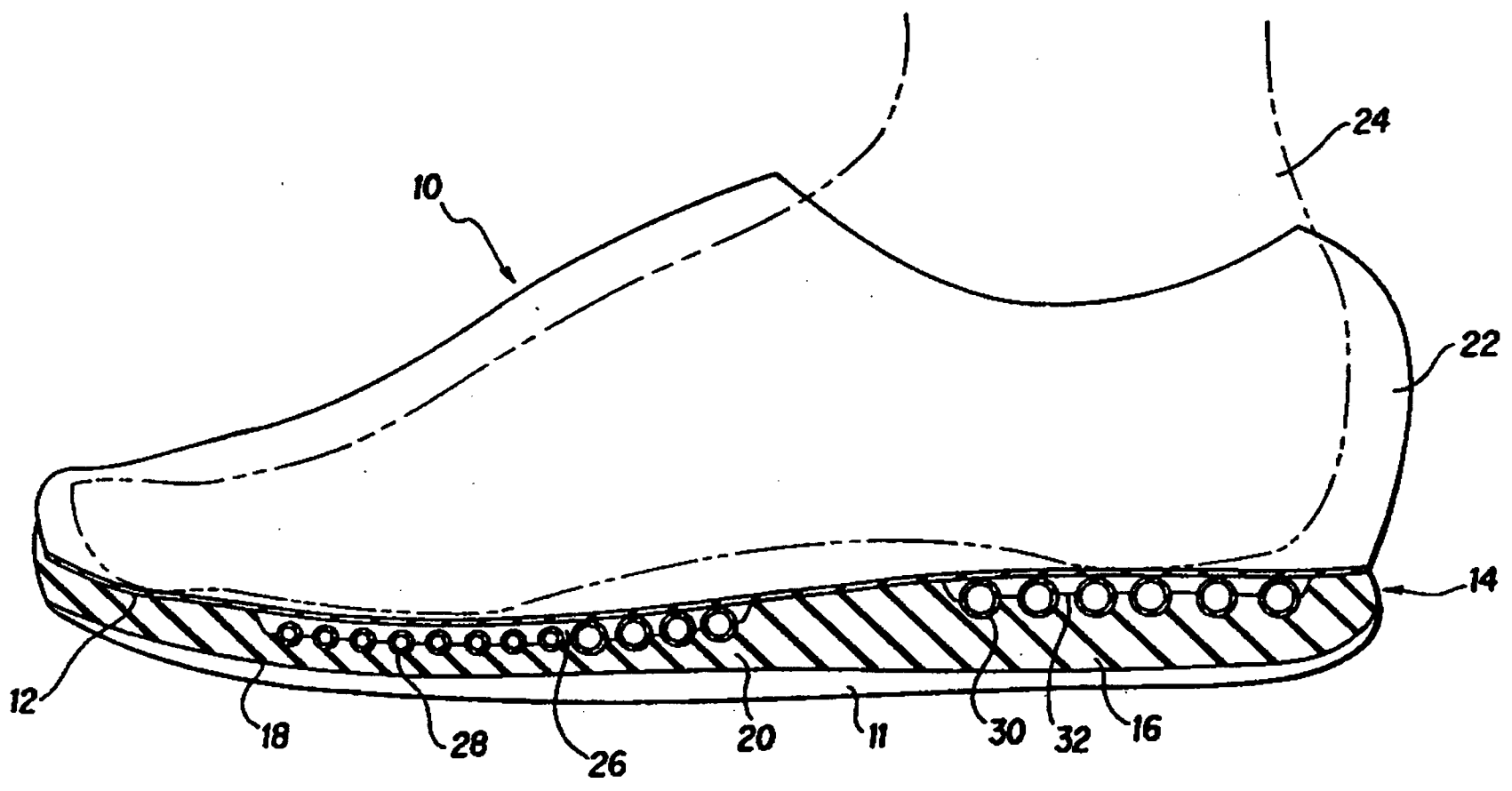


FIG. 1

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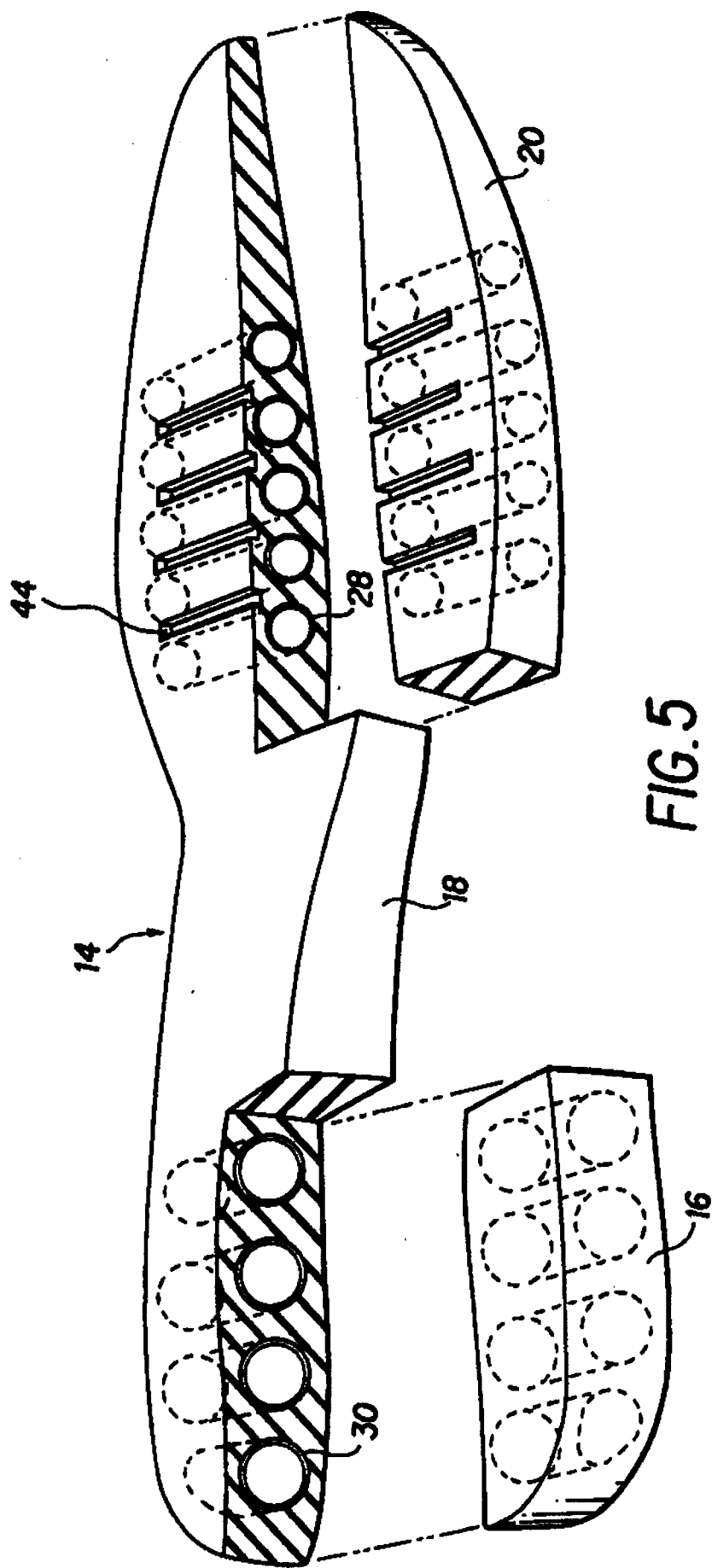


FIG. 5

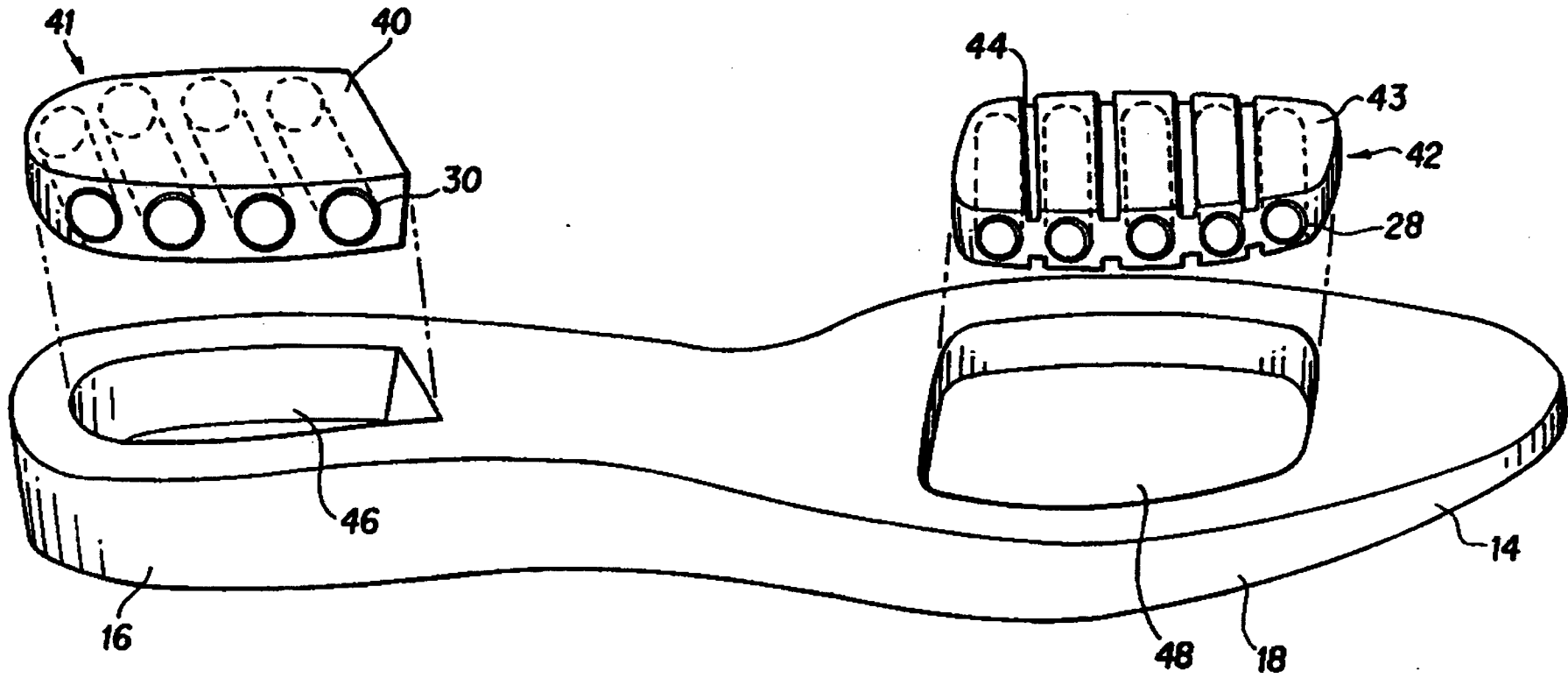


FIG. 6

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in the second stage of compression there is a positive pressure gradient; the more the midsole is compressed the greater force is needed to compress. In the Cohen device there may also be secondary buckling of the ribs because the forces are not angled along the rib.

It is clear from the developments discussed above that there are many disadvantages in the art related to the present invention. The disadvantages of encapsulated gas soles include high construction costs, lack of stability, puncture problems, temperature dependence, and diffusion of gas out of the gas container. For other soles having various apertures, the disadvantages include abrupt changes in the pressure needed to deflect the midsole. Other shoes simply have not recognized the need to provide a sole having good rebound as well as cushioning.

One of the trends in athletic footwear is to present the technology of the footwear in such a fashion as to enable the purchaser to visualize the technology. Unfortunately, it can be difficult to display the technology without adversely affecting the performance of the shoe. For example, some shoes have provided "windows" for viewing the interior of midsoles. Such windows, placed on the edge of the midsole, may effect the cushioning characteristics of the midsole. If such is the case, displaying the technology may outweigh whatever benefits may be derived from the technology itself.

One of the objects of the invention is to provide a way of viewing the invention in a useful and unobtrusive way.

SUMMARY OF THE INVENTION

In accordance with the purposes of the present invention as embodied and broadly described herein, the athletic shoe of the present invention utilizes an upper and a midsole which is disposed in a conventional manner below the upper. The midsole includes an elastomeric material and has a number of spaced-apart horizontal tubes extending the width of the midsole which are encapsulated in the elastomeric material. The tubes are hollow and lay side by side in a direction either perpendicular to the longitudinal axis of the shoe, parallel to the axis, or in any other direction functional for foot and shoe mechanics. The elastomeric material has a hardness less than the tubes and fills the space between the tubes. The tubes preferably have a Shore D Durometer hardness of between 55 and 72 and are spaced at a distance which causes the material between the tubes to compress when a force is applied perpendicular to the midsole. The material between the tubes is compressed because of the deformation of the tubes and causes the tubes to resist further compression.

In another aspect of the invention, the elastomeric material used to form the midsole preferably has an Asker C Durometer hardness of between 35 and 65. The elastomeric material may be made of either polyurethane (PU) or ethylene vinyl acetate (EVA).

In yet another aspect of the invention, the tubes may be placed in either the heel portion of the midsole or in the forefoot portion of the midsole or both. The tubes used in the athletic shoe preferably have a circular cross-section and have an outside diameter of between 4 and 18 millimeters and have a wall thickness of between 0.4 and 1.0 millimeters. The spacing between adjacent tubes is preferably between 0.5 and 9.0 millimeters.

In yet a further aspect of the invention, the tubes used within the midsole are preferably made of Hytrel (TM),

manufactured by E. I. DuPont de Nemours and Company, Inc.

In yet another aspect of the invention, the tubes, when placed in the forefoot part of the midsole, are preferably disposed at a 13° angle from perpendicular to the longitudinal axis of the shoe and are substantially parallel to a line formed by the metatarsals of the foot.

One advantage of the invention is that maximum rebound effect can be obtained by using a particular spacing of tubes in a midsole. Another advantage of the invention is that the midsole of the present invention is easily manufactured and utilizes easily available materials.

Another advantage of the invention is realized when using Hytrel, which has good rebound characteristics, is lightweight, and provides superior cushioning effects. Hytrel is also a sturdy material and is easily bonded to the surrounding elastomeric midsole.

In yet another aspect of the invention, an athletic shoe is provided which includes an outsole which defines a cutout. The athletic shoe has a midsole which includes a body portion and an insert portion, the insert portion including tubes for providing energy return and being visible through the cutout in the outsole.

In yet another aspect of the invention, the tubes are seated in seating grooves which are formed from the body portion of the midsole.

In yet another aspect of the invention, a transparent polyurethane forms a window for enabling visualization of the tubes in the midsole.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawings, which are incorporated in and form a part of the specification, illustrate the embodiments of the present invention and, together with the description, serve to explain the principles of the invention. In the drawing:

FIG. 1 is a longitudinal, sectional side view of an athletic shoe midsole incorporating a preferred embodiment of the present invention;

FIG. 2a is a schematic showing adjacent tubes of the present invention without force being applied;

FIG. 2b is a schematic showing adjacent tubes of the present invention with a force applied;

FIG. 3 is a perspective view of one embodiment of the invention utilizing tubes in the forefoot of a shoe;

FIG. 4 is a perspective view of an embodiment of the present invention utilizing tubes in the heel portion of a midsole;

FIG. 5 is a perspective, partially cutaway, exploded view showing one possible construction of the invention;

FIG. 6 is a perspective, exploded view of another possible construction of the present invention;

FIG. 7 is a view of the bottom of a shoe utilizing one embodiment of the invention;

FIG. 8 is a side view of FIG. 7 the direction of arrow 8;

FIG. 9 is a cross-section of FIG. 7 cut along line 9-9;

FIG. 10 is a bottom of a shoe showing an alternate embodiment of the invention; and

FIG. 11 is an exploded cross-sectional view of one embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the accompanying drawings, FIG. 1 is a side elevation view of an athletic shoe incorporating the

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the invention shown in FIGS. 7-11 to allow the storing of energy between tubes 62, 64, and 66.

As forces are removed from midsole 52, the tubes 62, 64, and 66 return to their original shape. The compressed material between tubes returns energy to the wearer. By making tubes 62, 64, and 66 out of a material such as Hytrel, the tubes 62, 64, and 66 return quickly to their original shape. It is important that the tubes 62, 64, and 66 cycle back quickly to their relaxed, unstressed state prior to being reloaded with forces.

The spacing 72 between tubes is selected to provide optimum cushioning and rebound. Typically, this spacing will be on the order of between 0.5 and 9.0 millimeters.

A transparent window 78 is provided to cover tubes 62, 64, and 66. This transparent window 78 is made of a material such as thermal polyurethane (TPU). TPU is used because it is durable, transparent and flexible. PVC or other materials may also be used to practice the invention. The transparent window 78 is exposed through the cutout 56 in the outsole 54. Typically, the window 78 will be oriented so that it does not make contact with the ground. Contact with the ground is prevented because the window 78 does not extend below outsole 52. The transparent window 78, together and in conjunction with the body portion of the midsole, will encapsulate tubes 62, 64 and 66.

Having said this, making the window out of an abrasive-resistant material such as TPU enables the window 78 to be subjected to the unavoidable incidental contact which will undoubtedly occur due to imperfections in whatever surface the user is walking or running on. In the embodiment of the invention depicted in the accompanying figures, the window 78 is spaced apart from the plane formed by the lowermost surface of the outsole at a distance of approximately 1-2 millimeters. This distance need not be constant and is not critical to the practice of the invention.

Flexure grooves 80 (FIG. 9) may be provided in the window 78 to aid in the bending of the heel portion of the athletic shoe. The window 78 may follow the general curvature of the tubes as shown in FIG. 9. This increases visibility of the tubes since diffraction through the window is decreased by use of such an arrangement.

To secure the window 78 to the other components of the athletic shoe, a flange 82 (FIGS. 9 and 11) may be provided which is positioned between outsole 54 and the body portion 60 of midsole 52.

FIG. 9 illustrates an embodiment of the invention in which the rearwardmost tube 70 is completely encapsulated within the material forming window 78. This embodiment enables the rearwardmost tube to be seen from both the bottom of the shoe and the side of the shoe.

FIG. 10 is an embodiment of the invention in which window 78 is completely bordered by outsole material. Even with the window being completely bordered by outside material, the tubes may nevertheless be visible through the back or side of the shoe by providing an opening in the body portion of the midsole. Other possible embodiments would include cutouts and transparent windows of different sizes and shapes, a plurality of

cutouts and transparent windows, and cutouts and transparent windows which are located in an area other than the heel.

In addition, such variables as the thickness and size of the window may be varied to provide less weight, if desired.

FIG. 11 is an exploded view of the embodiment of the invention shown in FIG. 9. In this figure, it can be seen that the seating grooves 74 are commensurate in size to the tubes 62, 64, and 66.

The foregoing description of the preferred embodiment of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and obviously many modifications and variations are possible in light of the above teachings. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications to thereby enable others skilled in the art to best utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. For example it is possible that the tubes used to practice the invention may have a noncircular cross-section. It is possible for instance to have a cross-section which acts in a similar manner as the circular cross section described above. Although the drawings show tubes which are disposed perpendicular to the longitudinal axis of the shoe, it is possible to include tubes at other orientations. It may also be possible to make the insert portion of the midsole removable. It is intended that the scope of the invention be defined by the claims appended hereto.

What is claimed is:

1. An athletic shoe having a sole, said sole comprising:
 - (a) an outsole, said outsole having a cutout region;
 - (b) a midsole, said midsole having a body portion, and an insert portion, wherein said insert portion of said midsole includes a plurality of substantially tubular chambers, and wherein said body portion includes seating grooves which correspond to the shape of said tubular chambers, wherein said tubular chambers are substantially positioned within said seating grooves; and
 - (c) a substantially transparent window disposed within said cutout region of said outsole, said transparent window being in contact with and substantially following the curvature of said tubular chambers.
2. The athletic shoe of claim 1 wherein said insert portion comprises a plurality of individual, unconnected tubes.
3. The athletic shoe of claim 1 wherein said tubular chambers extend substantially perpendicular to the longitudinal axis of said sole.
4. The athletic shoe of claim 1 wherein at least one of said tubular chambers is disposed substantially adjacent to an edge of said sole, and wherein said window is in contact with and extends along at least one of said tubular chambers to form a portion of a side of said shoe.

* * * * *

D 3

United States Patent [19]

Sang Do

[11] Patent Number: 5,224,277

[45] Date of Patent: Jul. 6, 1993

[54] FOOTWEAR SOLE PROVIDING VENTILATION, SHOCK ABSORPTION AND FASHION

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[21] Appl. No.: 873,664

[22] Filed: Apr. 23, 1992

Related U.S. Application Data

[63] Continuation of Ser. No. 586,606, Sep. 21, 1990, abandoned.

[30] Foreign Application Priority Data

May 22, 1990 [KR] Rep. of Korea 90-6939

[51] Int. Cl.⁵ A43B 13/28

[52] U.S. Cl. 36/27; 36/3 R; 36/3 B; 36/28; 36/35 R

[58] Field of Search 36/3 R, 3 A, 3 B, 28, 36/29, 35 R, 35 B, 27

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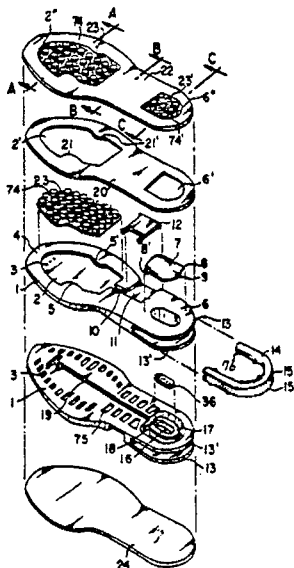
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Primary Examiner—Steven N. Meyers
Assistant Examiner—Thomas P. Hilliard
Attorney, Agent, or Firm—Darby & Darby

[57] ABSTRACT

A footwear sole has a waterproof ventilation part secured in the midsole or the outsole, and a horseshoe-shaped shock-absorbing heel member secured in the heel portion of the sole part in which the waterproof and ventilation part is secured. The waterproof and ventilation part includes a buoyancy plate that blocks penetration of water into the sole during bad weather. The shock-absorbing heel member has opposite flanges with an empty space therebetween that insure very good shock-absorbing properties of the shock absorbing heel member.

29 Claims, 15 Drawing Sheets



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FIG. 13A

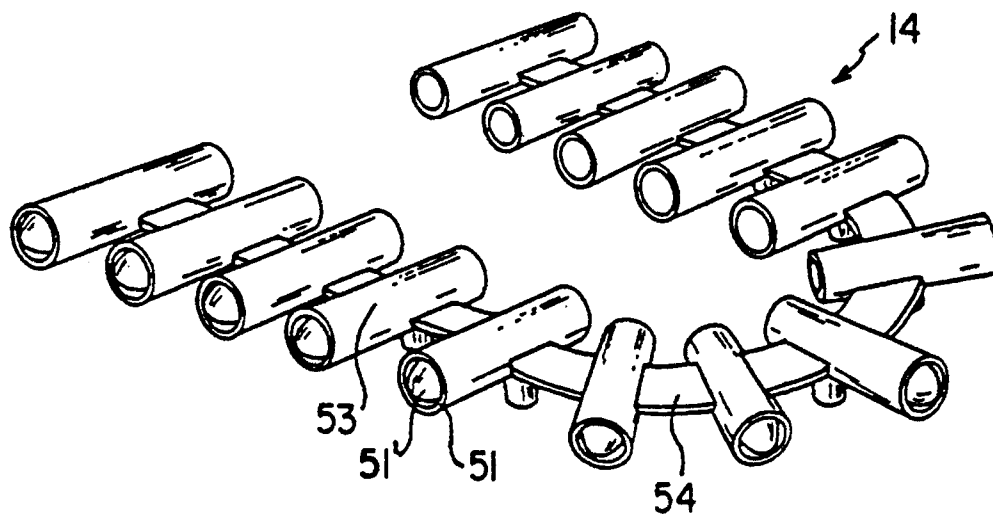


FIG. 13B

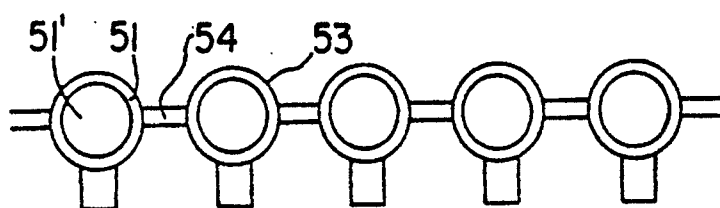


FIG. 13C

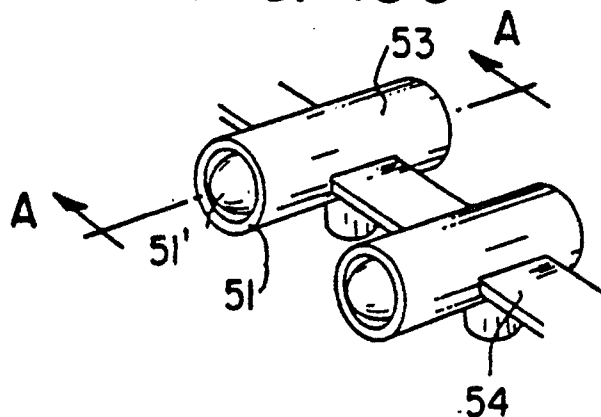
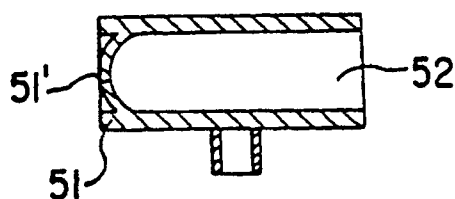


FIG. 13D



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FIG. 14A

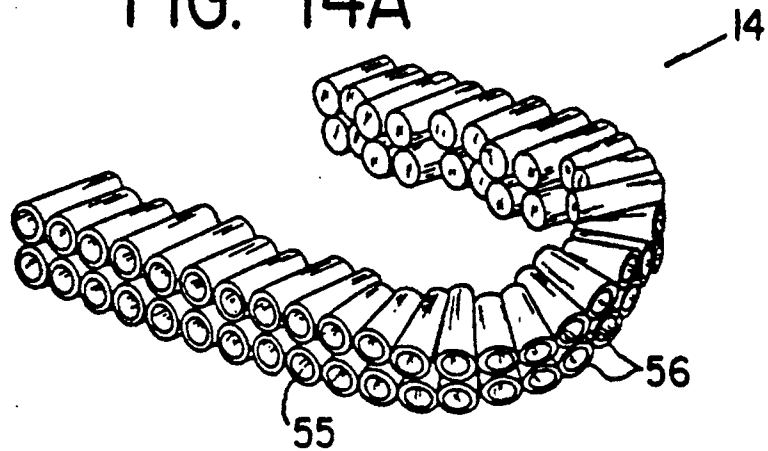


FIG. 14B

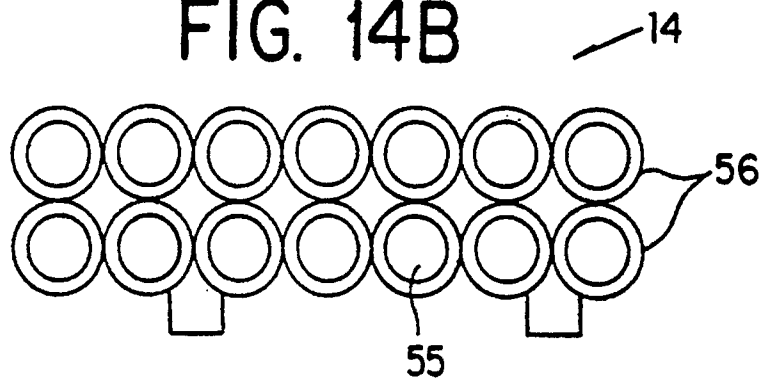


FIG. 14C

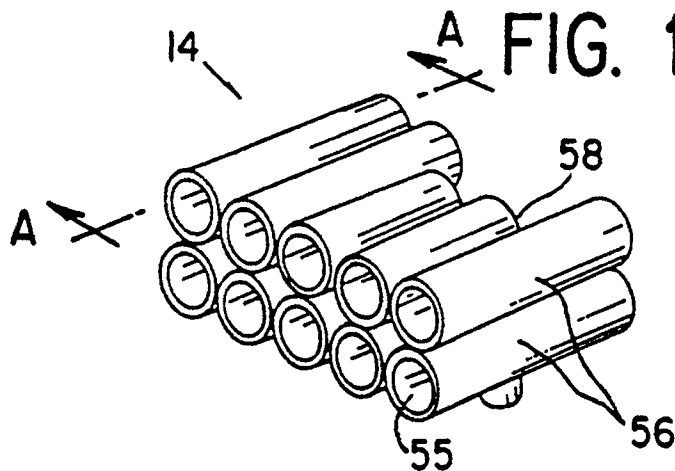
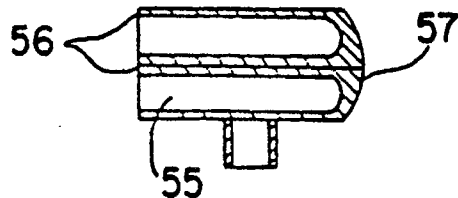


FIG. 14D



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FIG. 15A

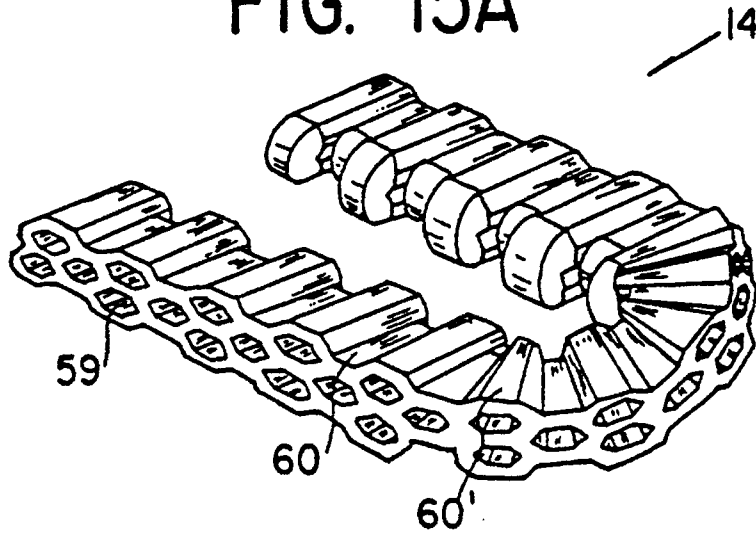


FIG. 15B

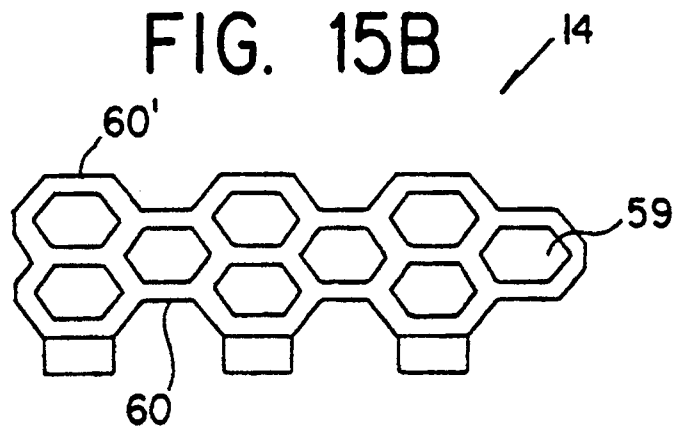


FIG. 15C

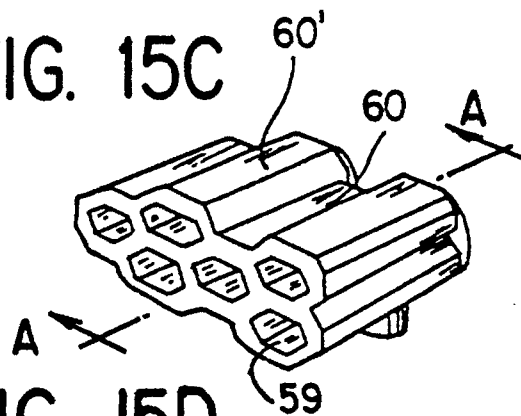
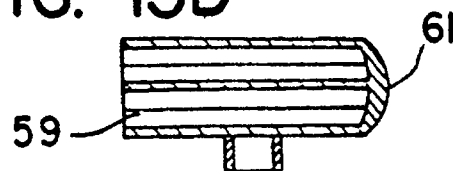


FIG. 15D



passage (29) is formed between the ventilation walls (28)(28') while the air supply passage (30) is located outside the ventilation walls (28)(28').

One portion of the exhaust passage (29) is connected to the exhaust hole (29') while one portion of the air supply passage (30)(30') is connected to the air supply hole (30''), respectively. The shank part (25') on the reverse side of the outsole (25) has a projected waist part (31) serving as a stiffening rib, and the rear heel part (32) has a receiving groove (11').

The waterproof and ventilation part (12) is fixable in the receiving groove (11'), while the horseshoe-shaped shock-absorbing member (14) forming a body corresponding to the heel part (32) is fitted between upper (13) and lower (13') flaps of the outsole (25).

The upper and lower parts of the rear shock-absorbing member (14) have flanges (15)(15') and the flat sole (33) is fixed to the reserve side of the heel part (32).

The air ventilation chamber (26') is also formed in the board (20') corresponding in shape to the outsole (25).

The circular arc-shaped element (27'') extends into the air ventilation chamber (26'). The insole (22') has an air ventilation chamber (26'') and receiving chamber (6'') corresponding to those of the board (20').

The air ventilation chamber (26'') and the receiving chamber (6'') have cushion air bags (23)(23').

The length of its reverse side is so formed that the lower sectional part of the cushion air bags (23)(23') may contact the bottom of the air ventilation chamber (26) of the outsole (25) and the surface of the board (20').

In FIG. 1, the cushion air bags (23) in the ventilation chamber (2) of the midsole may displace those in the ventilation chamber (2'') of the insole.

In FIG. 2, the cushion pad (34) with cushion projections (35) and ventilation holes (74'') may be optionally located in the air ventilation chamber (26) of the outsole.

The waterproof and ventilation part (12) shown in detail in FIG. 9, constitutes a rectangular box-shaped body with holding joint means (38).

In the center of the reverse side of the upper plate (39) of the part (12), a small tubular part (40) extends vertically, and half of this part (40) is cut and closed at the backwall (42) of the body by a wall of inhalation and exhalation chamber (41).

Due to the partition of the wall (42) of inhalation and exhalation chamber (41), a ventilation chamber (43) and a water-receiving chamber (44) are formed in the waterproof and ventilation part (12).

The water-receiving chamber is connected to the ventilation opening (45) of the front wall (42') and the tubular part (40).

The inhalation and exhalation opening (46) of the pipe and the ventilation chamber (43) is connected to the ventilation part of the rear wall (42).

Under the tubular part (40), the bottom of the box-shaped body is closed with an outer plate (50) which has separate upwardly extending projections (49) for a buoyancy plate (48).

FIG. 13-26 are views showing different types of shock-absorbing heel members.

The shock-absorbing heel members are made of saturated resin or rubber with good elasticity. Being of a long form, they are all formed as a horseshoe-shaped hoof to be fixed in the midsole (1) of a sport footwear or the outsole of shoes and different soles of other footwear.

The shock-absorbing heel member (14) of FIGS. 13A-13D comprises a plurality of hollow pipes (53) connected with connecting bands (54). The inner end (52) of pipes (53) is open while the outer end is provided with a flange (51) and a circular arc-shaped projection (51').

The shock-absorbing heel member (14) of FIGS. 14A-14D comprises a hollow element (55) consisting of two rows of cylinders (56) closed at the inner ends thereof.

The shock-absorbing heel member (14) of FIGS. 15A-15D is formed of a plurality of duplicated hexagonal bodies (60') forming a hollow part (59) with hexagonal bodies (60) between bodies (60'). The hexagonal bodies (60') are closed at the inner side thereof with an inner arcuate part (61).

The shock-absorbing heel member (14) of FIGS. 16A-16D is formed so that the inside hollow cavity thereof is partitioned by a wall (64) arranged between the upper and lower walls (63) (63'). The cavity defined by spaced walls (63)(63') is closed by a circular arc (62). The wall (69) supports a plurality of internal mandrels (65). The outer end portions of the upper and lower walls (63)(63') form flanges (15) (15').

The shock-absorbing heel member of FIGS. 17A-17D is somewhat similar to that of FIGS. 16A-16D with the internal mandrels (67) (67') provided between the upper and lower walls (66)(66') and whose inner end is closed by a circular arc (62').

The shock-absorbing heel member of FIGS. 18A-18C is formed so that the half-ring bodies (69)(69') are provided between the upper and lower walls (68)(68'), and the outer end portions of the upper and lower walls (68)(68') form flanges (15)(15').

The shock-absorbing heel member (14) of FIGS. 19A-19C is formed so that it comprises a plurality of half-ring bodies (71) and a plurality of internal mandrels (72) supported between the upper wall (70) and the lower wall (70') of which the internal ends are closed by a circular arc (62''). The lower part of the half-ring bodies (71) has supporting bodies (73). The external end portions of the upper and lower walls (70)(70') form flanges (15)(15').

The shock-absorbing heel member (14) of FIGS. 20A-20D is formed so that the horseshoe-shaped shock-absorbing heel member (14) has flanges (15)(15') on the upper and lower part of the external outskirts with tubular bosses (76)(76'), respectively.

The heel member (14) contains elastic balls (77) or a pipe (78).

The shock-absorbing heel member (14) of FIGS. 21A-21D is formed so that its hollow element consists of a plurality of oral pipe sections (81) connected with bands (54''). The outer ends of pipe sections (81) are closed with circular arc-shaped elements (80) and defined therewith flanges (15).

The shock-absorbing heel member (14) of FIGS. 22A-22C is formed so that the internal cavity thereof defined by upper and lower walls, is closed by circular arcs (82) and includes triangular bodies in alternating upright and upside-down positions. The member has a horseshoe shape.

The shock-absorbing heel member (14) of FIGS. 23A-23B is formed so that the internal cavity defined by upper and lower walls is closed by circular arcs (84) and includes alternating upright and upside-down T-shaped bodies. The member has a horseshoe shape.

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US005822886A

United States Patent [19]
Luthi et al.

[11] **Patent Number:** **5,822,886**
[45] **Date of Patent:** **Oct. 20, 1998**

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[54] **MIDSOLE FOR SHOE**
[75] **Inventors:** **Simon Luthi; Xavier Kälin**, both of
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Lonnerstadt, Germany; **Edgar Stüssi**,
Schlieren, Switzerland
[73] **Assignee:** **Adidas International, BV**, Netherlands

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[21] **Appl. No.:** **548,744**
[22] **Filed:** **Oct. 25, 1995**

Related U.S. Application Data

[63] Continuation of Ser. No. 280,208, Jul. 25, 1994, Pat. No. 5,461,800.
[51] **Int. Cl.⁶** **A43B 13/18**
[52] **U.S. Cl.** **36/28; 36/27; 36/114**
[58] **Field of Search** **36/28, 25 R, 7.8, 36/27, 31, 35 R, 114, 29, 38, 37**

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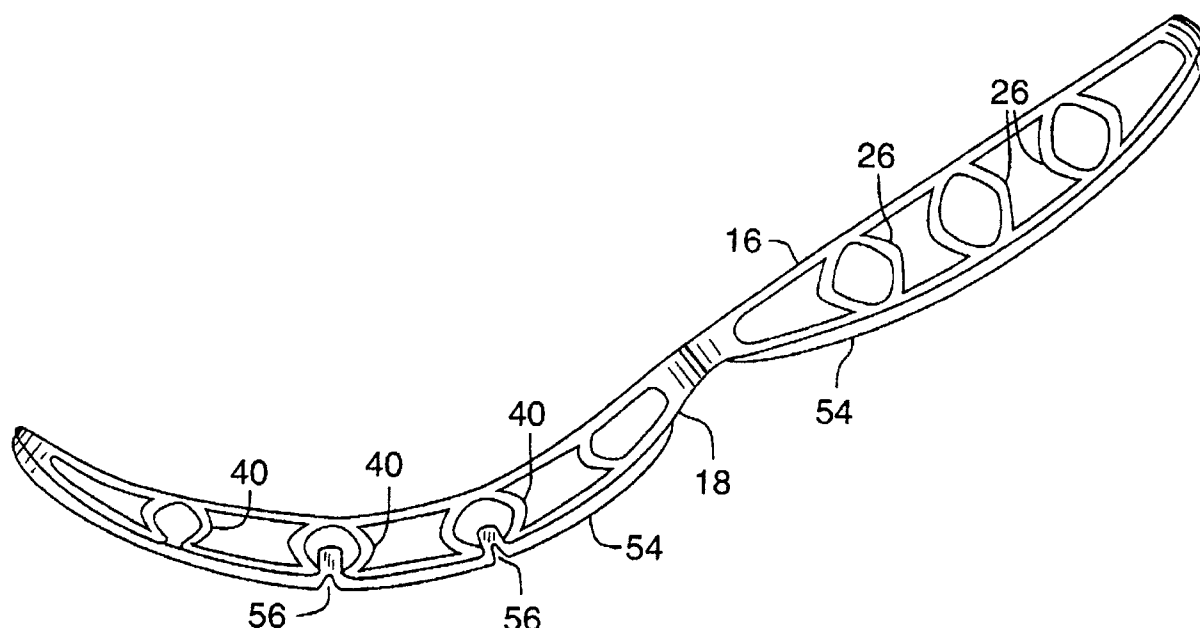
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Primary Examiner—Paul T. Sewell
Attorney, Agent, or Firm—Gilbreth & Strozier, PC; Robert W. Strozier; J. M. (Mark) Gilbreth

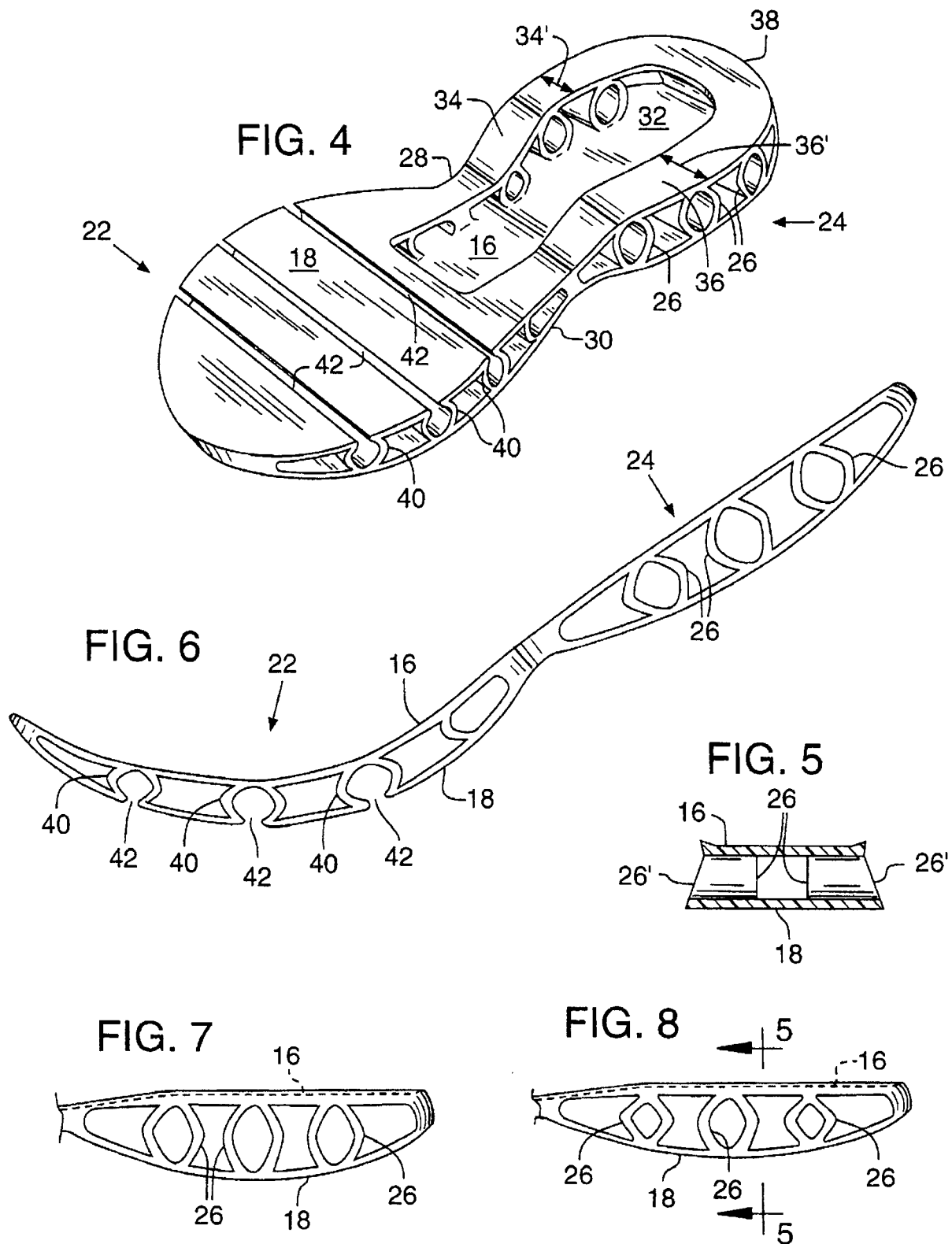
[57] **ABSTRACT**

An integrally molded midsole for an athletic shoe having tubular suspension members disclosed. The tubular suspension members behave as springs and have spring constants which may be designed for a particular application by choice of the tube length, the tube wall thickness or the hardness of the tube material. Preferably, the midsole is made of an elastomer such as HYTREL that is cast in a preformed shape and thereafter subjected to substantial compressive forces so that the tubular springs take a compression set and thereafter perform as near-ideal springs.

39 Claims, 3 Drawing Sheets



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FIG. 9

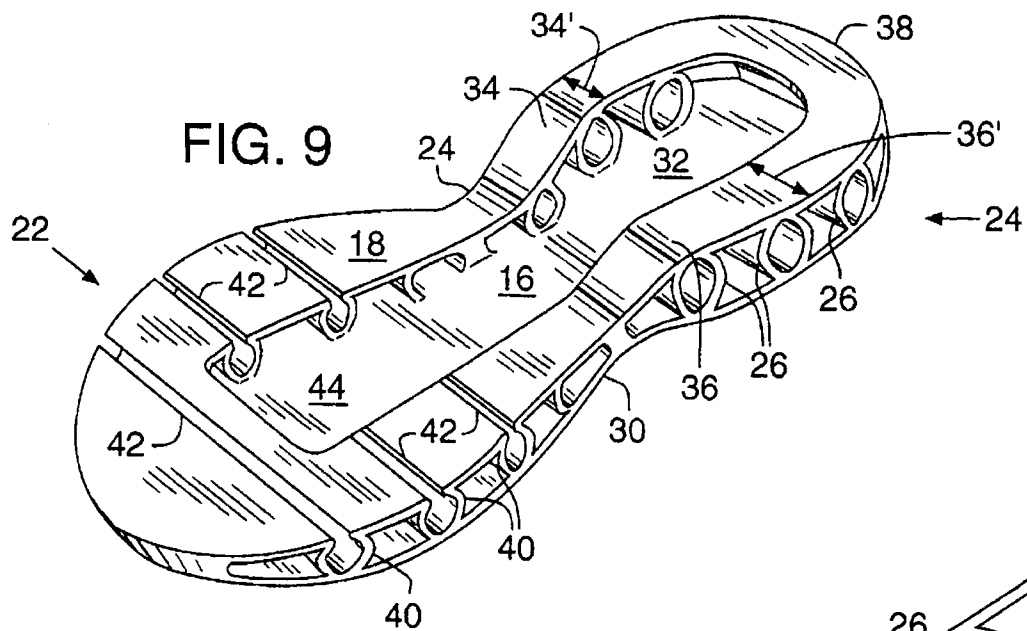


FIG. 10

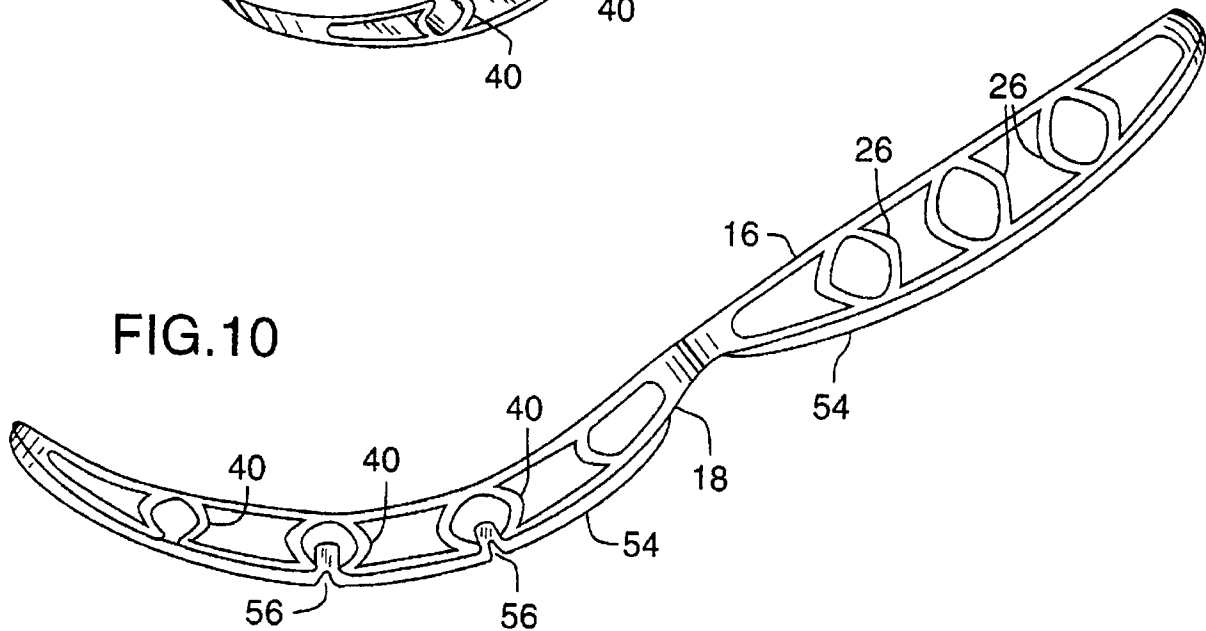
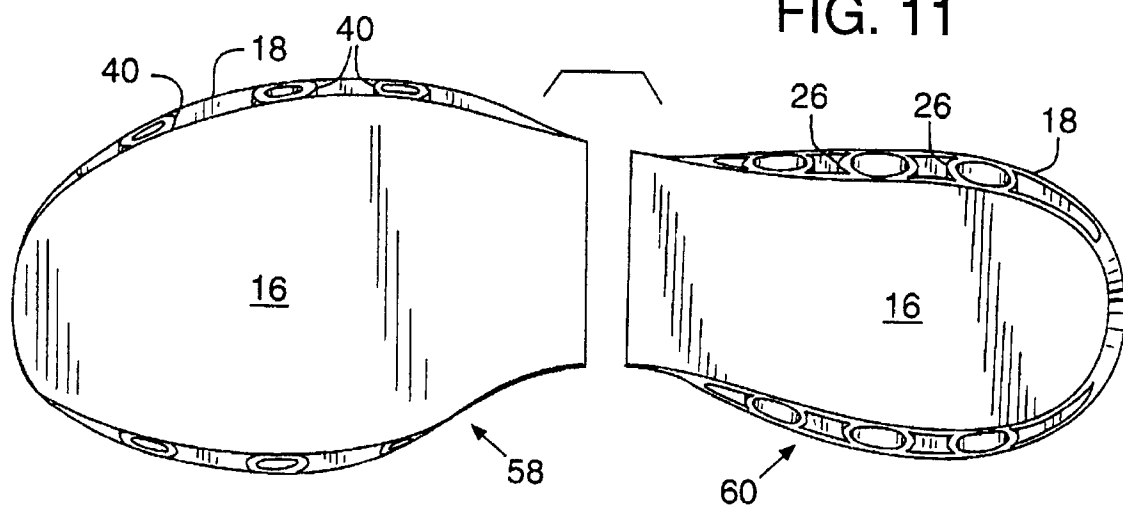


FIG. 11



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MIDSOLE FOR SHOE

This application is a continuation of U.S. patent application Ser. No. 08,280,208, filed Jul. 25, 1994 now U.S. Pat. No. 5,461,800.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to soles for shoes and more particularly relates to a midsole for an athletic shoe.

2. Description of Related Art

Soles in athletic shoes are expected to provide shock absorption and stability. Shock absorption minimizes the impact of a runner's footfalls to lessen stress on the leg muscles and joints. Stability is necessary to control the amount of lateral motion of a foot in order to prevent over pronation thereby lessen the stress on the lower legs.

During normal motion, the foot of a typical runner hits the ground heel first. The foot then rolls forwardly and inwardly over the ball of the foot. During the time that the foot is moving from heel strike to the ball of the foot, the foot is typically rolling from the outside or lateral side, to the inside or medial side of the foot; a process called pronation. After the ball contacts the ground, the foot continues rolling forward onto the toes. During motion through ball and toe contact, the foot rotates outward as the toes prepare to push off; a process called supination. The foot remains supinated while it is lifted off the ground between footfalls.

Pronation, the inward roll of the foot in contact with the ground, although normal, can be a potential source of foot and leg injury if it is excessive. Many prior art soles have been designed with the goal of preventing over pronation and controlling supination. The lateral motion of the foot, that is abduction and adduction, can be controlled by providing a stable sole. However, as the stability of the sole increases, the shock absorption properties of the sole decrease. Thus, soles must be designed to properly balance the properties of stability and shock absorption to provide optimum characteristics for both parameters. This design goal is further complicated by the fact that foot size is largely unrelated to body mass. For example, two people of equal weight may have feet that are two or three sizes apart and conversely, two people with the same foot size may have substantially different body mass. Thus, a shoe that is stable for a 130 pound, size 9 runner may not be stable for a 160 pound, size 9 runner.

Durability of the midsole, as measured by its ability to withstand cyclical loading without degradation of midsole properties, is also an important design goal. Most present-day athletic shoes use a midsole of an elastomeric foam, such as ethylene vinyl acetate (EVA). EVA foam allows designers to adjust the density, and hence the hardness, of the foam to provide various midsole properties in an attempt to balance shock absorption and stability. As is well-known to those skilled in the art, the higher-density EVAs provide a stable platform but less shock absorption, while the low-density EVA foams provide better shock absorption but less stability because they cannot control the lateral movement of the foot. EVA foams typically have a useful life of approximately 800,000 cycles before there is a noticeable degradation in their performance. For these and other reasons, there is a continuing search for alternative midsole designs.

Cohen, U.S. Pat. Nos. 4,753,021 and 4,754,559, discloses a midsole for a shoe having a sheet of rubber-like material

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with a plurality of ribs separating an upper and lower surface. As a load is applied to the midsole the ribs collapse thereby absorbing energy. As a load is removed the resilient nature of the ribs causes them to spring back to their previous shape. Cohen discloses plural embodiments including those in which the ribs form channels that are arranged parallel to, and orthogonal to a longitudinal axis of the elongate sole. Because of the design and choice of materials, Cohen would not represent an enhanced performance sole for use in an athletic shoe.

SUMMARY OF THE INVENTION

The present invention seeks to provide a midsole having superior stability and shock absorption properties in a midsole design that can be customized for different applications and body-type characteristics. In addition the present invention seeks to provide a high performance midsole having superior durability.

A preferred embodiment of the present invention provides a molded midsole formed of an elastomer whose ratio of plastic deformation to elastic deformation is greater than 1.5 to 1. Preferably, the elastomer is a copolyester polymer elastomer such as that manufactured and sold by E. I. duPont de Nemours under the trademark HYTREL. The present invention has been cyclically loaded to 1.2 million cycles before suffering a degradation of performance. This represents a 50% increase in useful life over typical prior art EVA foam soles.

In the preferred embodiment, the midsole is an integral, one-piece-molded midsole having a curvilinear, elongate top surface and a plurality of integrally molded, transversely arranged tubes which individually function as compression spring elements. A lower surface is integrally molded with the lower portion of the tubes thereby providing more structural integrity for the midsole and providing a surface upon which an outer sole may be applied.

The performance properties of the midsole can be controlled by changing the spring constant of the tubes such as by increasing the wall thickness of the tubes, increasing the tubes' length or the hardness of the material. For example, in the heel section of a preferred embodiment, short tube segments are provided along lateral and medial edges of the midsole thereby providing a central opening having no tubes therein. The midsole can be designed so that the tubes along the medial edge have thicker wall sections, or are slightly longer, than the tubes along the lateral edge, thereby creating a higher spring constant and providing control for over pronation. Also, a preferred embodiment includes forefoot tubes having slit-shaped openings along their length to permit a great deal of midsole flexibility along the longitudinal direction. Additionally, the wall thickness of the forefoot tube can be greater along the medial edge than the lateral edge, or vice versa, to provide lateral stability for different types of runners, e.g., over pronators.

In other preferred embodiments of the invention the midsole is manufactured in two pieces comprising a forefoot section and a rearfoot section. Each individual section would substantially resemble its respective portion of the one-piece integrally molded midsole. However, by manufacturing the midsole in two pieces it may be possible to reduce the number of manufacturing molds. Additionally, it would be possible to mix properties between various rearfoot sections and forefoot sections. For example, a rearfoot section designed for a heavy heelstrike-type runner and having good shock absorption could be combined with a forefoot section providing substantial stability against over pronation.

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Various advantages and features of novelty which characterize the invention are particularized in the claims forming a part hereof. However, for a better understanding of the invention, its advantages, and objects obtained by its use, reference should be had to the drawings which form a part hereof and to the accompanying descriptive matter in which there is illustrated and described preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

- FIG. 1 is a side view of a running shoe worn by a runner.
FIG. 2 is a top plan view of a preferred embodiment of a midsole of the present invention.
FIG. 3 is a side elevation view taken of the midsole of FIG. 2.
FIG. 4 is a perspective bottom view of a preferred embodiment of a midsole of the present invention.
FIG. 5 is an elevational cross-section taken along lines 5-5 of FIG. 8.
FIG. 6 is a side elevation view wherein a midsole is flexed along a forefoot portion.
FIG. 7 is a detail of a side elevation view of a preform heel portion of a midsole of the present invention.
FIG. 8 is a detail of a side elevation view of a heel portion of a midsole of the present invention.
FIG. 9 is a bottom perspective view of a midsole of an alternative embodiment of the present invention.
FIG. 10 is a side elevation view of the midsole and further showing an attached outer sole.
FIG. 11 is a top plan view of an alternative embodiment of the midsole of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 shows a midsole 10 of the present invention in its preferred environment as a midsole for an athletic shoe 12 to be worn by a runner or the like. Typically, the shoe 12 is attached to the runner's foot by a lacing system 14.

With reference to FIGS. 2-8, a preferred embodiment of the midsole 10 is shown as a one-piece, injection-molded elastomer having a top surface 16, a bottom surface 18, and a plurality of structural webs 20 that extend between the top surface 16 and the bottom surface 18. Preferably, the structural webs 20 form a tubular structure that is integrally formed with the top and bottom surfaces.

Conceptually, the midsole 10 can be divided into a forefoot section 22 and a heel section 24. Preferably, the structural webs 20 along the heel section 24 form heel tubes 26 that extend inward from a medial edge 28 and from a lateral edge 30. As best shown in FIG. 4, a preferred embodiment of the present invention has discontinuous heel tubes 26 that extend from the medial and lateral edges 28 and 30, respectively, toward a central region 32 of the midsole having no tubes therein. The central region is bounded by heel tubes 26, bottom surface 18 and top surface 16. Further, in the heel section 24, the bottom surface 18 forms a "U"-shaped surface having legs 34 and 36 that extend from a rear tip 38 of the midsole toward the forefoot section 22. Associated with each leg 34, 36 is a width 34', 36', the significance of which will be explained below. Other embodiments of the heel section 24 may include heel tubes 26 that are continuous between the medial and lateral edges 28, 30, in which case the bottom surface 18 would extend substantially over the heel section 24 and there would be no tubeless central region 32.

The forefoot section 22 similarly comprises the integrally formed top surface 16, bottom surface 18 and intermediate structural webs 20. As with the heel section, the structural webs 20 preferably form elongate tubular members 40, hereinafter referred to as the forefoot tubes 40. In the preferred embodiment the forefoot tubes 40 have slit-shaped openings 42 that extend along the length of the forefoot tubes. The openings 42 permit substantial longitudinal flexibility in the forefoot section 22. In FIG. 6, the midsole 10 is shown with the forefoot section 22 flexed, and the slit openings 42 are shown spread open from their relaxed state. Substantial flexibility of the forefoot section along its longitudinal direction is a desirable property so that the athletic shoe 12 does not inhibit the natural tendency of the foot to roll from the heel onto the ball of the foot and onto the toe for push-off as the runner goes through a stride. The bottom surface is discontinuous at the openings 42.

In a preferred embodiment shown in FIG. 4, the forefoot tubes 40 extend continuously from the medial edge 28 to the lateral edge 30. In an alternative embodiment, shown in FIG. 9, the forefoot tubes 40 are discontinuous between the medial and lateral edges, thereby forming a central forefoot region 44 having no tubes therein. The bottom surface 18 forms a "U"-shaped surface around the central forefoot region 44 thus forming legs 46 and 48 having widths 46' and 48', respectively. The significance of the leg widths 46', 48' will be explained below. By forming the tubeless central forefoot region, the forefoot section becomes more flexible laterally.

Preferably, the entire midsole is injection molded as one integral piece of an elastomer having a tensile characteristic such that the ratio of plastic strain to elastic strain is greater than 1.5 to 1. One such elastomer is a copolyester polymer elastomer manufactured and sold by E. I. duPont de Nemours under the trademark HYTREL. HYTREL is reasonably inert and significantly, it is quite durable. Moreover, HYTREL is not subject to tear propagation even when made in relatively thin cross-sections. The preferred embodiments of the midsole use dupont's HYTREL composition number 5556. For a more complete description of this elastomer, see U.S. Pat. No. 4,198,037 and references cited therein. U.S. Pat. No. 4,198,037 is hereby incorporated herein by reference.

As noted, the midsole 10 is preferably injection molded of HYTREL. It is well known that HYTREL will take a compression set. For this reason, the midsole of the present invention is molded into a preform and is subsequently compressed to take that set. As is taught in U.S. Pat. No. 5,280,890, compression of the HYTREL material also results in orientation of the molecular structure and enhances the spring characteristics of the material.

The effect of this compression is illustrated in FIGS. 7 and 8. FIG. 7 illustrates the preform configuration, wherein the heel tubes 26 have been preformed into an oval cross-section so the tubes 26 are "tall," thereby providing a greater separation between the top surface 16 and the bottom surface 18. After the preform has been removed from the mold and annealed at room temperature for up to 24 hours. It is then compressed, preferably to a solid position. That is, the top surface 16 is pressed toward the bottom surface 18 thus radially compressing the heel tubes 26 and forefoot tubes 40. The midsole is compressed until it is "solid," wherein further force will not further move the surfaces together.

Upon release of the compressive force, the tubes 26, 40 will partially spring back to a somewhat circular configu-

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ration as shown in FIG. 8. The midsole takes a "set" in this position. Thereafter, the tubes 26, 40 may be partially compressed during use by the runner, but as the runner's weight is removed, the springs will completely return to their set configuration, such as is shown in FIG. 8. A complete description of the compression set procedure is provided in U.S. Pat. No. 5,280,890, which is hereby incorporated by reference. Material made in accordance with the above referenced compression set procedure is available from Miner Elastomeric Products Corporation of Geneva, Ill. under the brand name TECSPAK®.

The heel tubes 26 and the forefoot tubes 40 have the characteristics of springs and therefore have a measurable spring constant. It has not yet been determined whether the spring constant for the tubes of the present invention is a constant, or a function of the amount of compressive travel of the tubes. Furthermore, it has not yet been determined what the proper spring constant would be for the various configurations disclosed herein. However, it is known that various modifications to the configurations disclosed herein will affect the spring constant of the tubes so that the midsole 10 can be designed for particular types and weights of runners after empirical data has been collected.

The spring constant of the tubes can be increased by providing a longer tube. When the midsole 10 is loaded, the surfaces 16, 18 will move towards one another, thereby radially compressing the tubes under the given load. Obviously, a one-inch tube will radially compress more than a two-inch tube under the same load. Thus, the longer tube will have a higher spring constant. In the context of an athletic shoe, the higher spring constant means that the tube will provide greater stability but less cushioning.

The tubes 26, 40 have wall thicknesses 50 and 52, respectively which also affect the spring constants. A thicker wall thickness 50 or 52 will produce a higher spring constant. In the preferred embodiment of the present invention, the wall thickness of a particular heel tube 26 is constant along the length of the tube. The wall thickness of the forefoot tubes 40 varies between the medial edge 28 and the lateral edge 30, preferably in a step-wise fashion, wherein the wall thickness would be a constant along a portion of the forefoot tube 40, and the wall thickness would jump to a different thickness at some point along the length of the tube. Alternatively, it is envisioned that any of the tubes could be provided with a tapering wall thickness wherein the wall thickness changes gradually from one end to the other of a particular tube.

The preferred embodiment includes a two-stage spring constant in the heel section 24. The heel tubes 26 have a spacing 27 between the opposite walls of adjacent tubes. The spacing 27 is chosen so that those opposing walls touch as the tubes 26 are compressed. Further compression causes the tubes to press against each other thereby limiting the motion of the tube walls and changing the spring constant for further loading. Thus, the heel tubes 26 have an initial spring constant at the onset of compression and after the opposing walls of adjacent tubes make contact, the tubes have a different, higher spring constant.

It is envisioned that the ability to control the spring constants can be used in various combinations to precisely control the performance characteristics of the midsole. For example, in a preferred embodiment of the present

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invention, the heel tubes 26 are provided with a constant wall thickness, but the width 36' of the lateral leg 36 could be less than the corresponding width 34', thereby placing shorter tubes 26 on the lateral side 30 as compared to the tubes on the medial side 28. This configuration would create a shoe having a higher spring constant along its medial edge to resist over pronation. In a preferred embodiment, the width 36' is approximately 24 mm and the width 34' is approximately 26 mm.

Furthermore, the spring constant of the forefoot tubes 40 may be tailored by providing thicker wall sections in the tubes 40 in the regions proximate the medial edge 30 as compared to the wall thickness of the tubes 40 in the region close to the lateral edge 28. The varying wall thicknesses can be incorporated into the embodiments shown in FIG. 4 and FIG. 9.

As is shown in FIG. 5, the heel tubes 26 are provided with beveled ends 26' so that the transverse width of the bottom surface 18 is greater than the transverse width of the top surface 16 at any particular point along the longitudinal length of the midsole 10. By providing a wider bottom surface, the midsole is able to provide greater stability for the athletic shoe 12.

In the preferred embodiment of the present invention, the midsole 10 is provided with an outer sole 54, which is affixed to the bottom surface 18. Preferably, the outer sole 54 is made of a material having a high scuff resistance and substantial durability. Preferably, the outer sole 54 is provided with expansion joints 56 that cover one or more of the slit openings 42, thereby allowing the forefoot section to flex and permitting the slit openings to expand.

An alternative embodiment may include the midsole of the present invention fabricated into two sections. As shown in FIG. 11, the two sections would comprise a forefoot section 58 and a rearfoot section 60.

Making the midsole 10 into two sections provides numerous advantages. It may be possible to cut down on the number of molds necessary to provide midsoles for the full range of shoe sizes. For example, it may be possible to provide three different sizes of heel sections 60, while providing five different sizes of forefoot sections 58. The various sections can be mixed to provide the full range of shoe sizes.

Also, by providing a midsole in two sections, it is possible to design sections to meet specific performance requirements. For example, a rearfoot section 60 may be designed for a size 9, 150-pound runner having a substantial over pronation problem, and another heel section 60 may be designed for a size 9, 150-runner who under pronates. Likewise, the spring constants in the forefoot section 58 can be specifically tailored to different runners and performance characteristics.

The optimum values for the design parameters stated herein will be determined after extensive empirical data is collected. At present, the specific design parameters, such as, for example, optimum heel tube thickness and length for an over-pronating, 150 pound runner are unknown, and it is envisioned that physical testing will be necessary to determine such parameters.

Numerous characteristics and advantages of the invention have been set forth in the foregoing description, together with details of the structure and function of the invention.

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US006141889A

United States Patent [19]
Baum

[11] **Patent Number:** **6,141,889**
[45] **Date of Patent:** **Nov. 7, 2000**

[54] **FOOT SUPPORT AND METHOD (CIP VERSION)**

[76] **Inventor:** **Ira M. Baum**, Foot Balance Sysetem, Inc. 8940 N. Kendall Dr. Suite 801 E., Miami, Fla. 33176

[21] **Appl. No.:** **08/960,333**

[22] **Filed:** **Nov. 3, 1997**

Related U.S. Application Data

[63] Continuation-in-part of application No. 08/499,302, Jul. 7, 1995, abandoned.

[51] **Int. Cl.⁷** **A61F 5/14; A43D 9/00**

[52] **U.S. Cl.** **36/140; 36/43; 12/146 M**

[58] **Field of Search** **12/1 R, 1 G, 142 N, 12/146 M; 36/43, 44, 59 R, 59 C, 140**

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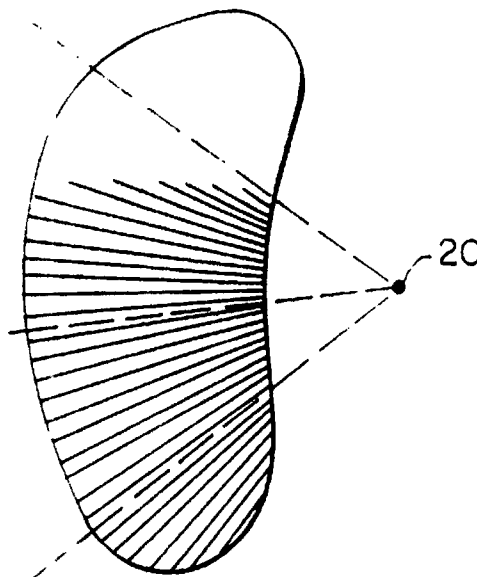
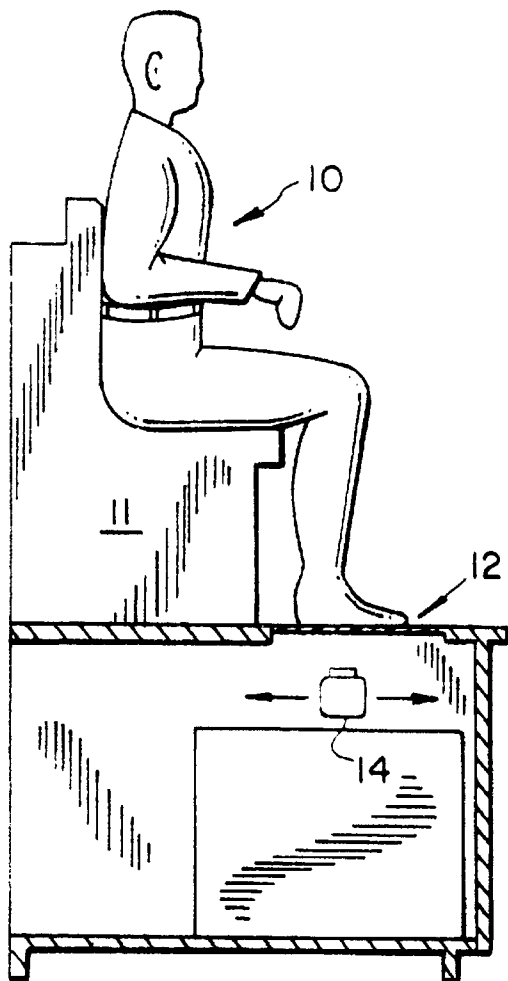
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Primary Examiner—M. D. Patterson
Attorney, Agent, or Firm—Fish & Richardson P.C.

[57] **ABSTRACT**

A foot support is prepared based upon a scan of the foot. The foot support has radial ridges and grooves on its upper and lower sections. The ridges and grooves converge at an imaginary center outside the foot print. The surface contour of the support do not duplicate the topography of the foot, but perform prescription manipulations.

12 Claims, 5 Drawing Sheets



aspect of the heel . . . pressure in the arch or heel persists, shaving of the medial arch contour and lowering of its height is indicated. When there was heel slippage, the patient was asked it get higher counter to the shoe or to use a heel grip or narrow last to the heel of the patient's shoes.

The orthotics fabricated using the technique described by Grumbina have problems with fit, the seating of the bottom surface of the orthotic in the shoe, and the seating of the foot on the top surface of the orthotic, all of which are addressed by the present invention.

The potential for the need for additional corrections to maximize control may be avoided. The potential for irritation on the bottom of the foot due to excessive pressure are also addressed by the present invention. "The casting position was significant enough to influence patient tolerance." (Grumbine Patent No. 5,054,148.) Grumbine's method utilizes a negative impression of the foot submitted by the prescribing doctor and a wand to digitize the internal surface of the native. Because the operator must manually place the probe, the use of a digitizing wand technique for inputting the data introduces numerous opportunities for error.

A further problem with the Grumbine device and method is that by providing parallel grooves in the bottom of the support, it actually can enhance the possibility of the foot support slipping forwardly and rearwardly in the shoe during the action phase of the patient. The same is true of course, of the foot contact on the upper surface which is provided with identical parallel lines to the shoe contact portion. Hence, there is a twofold potential for slippage.

Prior to the CAD-CAM production of foot orthotics as described in the Grumbine patent, custom foot orthotics and custom foot supports were made by hand, one at a time. The steps included:

- (1) Taking a negative plaster cast of the patient's foot. The effectiveness of the casting technique varied depending upon the person taking the plaster cast.
- (2) Pouring of plaster of Paris into the negative cast to obtain a positive mold of the patient's foot.
- (3) Subsequently stripping away the negative cast.
- (4) Altering the negative cast through the addition and removal of plaster from the original plaster positive to compensate for tissue expansion and foot correction or prescription.
- (5) Thermally applying hot material (mostly plastics) over the positive image to form a rough orthotic device, using an oven to heat the material until it was moldable, and a bladder press to conform the material to the positive image.
- (6) Grinding the orthotic to a rough shape based on prescription information.
- (7) Posting the forefoot (front area of the foot support) and rear foot (heel area of the foot support) to accomplish a defined angular relationship based on the prescription, foot, gait cycle, and activity.
- (8) Final grinding or finishing the orthotic to make it presentable to the patient.

The above shortfalls noted in prior art are in part a function of the need to produce the custom foot support form a negative cast of the patient's foot. It is well known that the comfort and function of an orthotic device will depend upon the position of the patient's foot during casting. Often, the casting process results in the patient's foot being pushed, massaged or otherwise placed in an unnatural position, which ultimately results in an uncomfortable and sometimes intolerable foot support. Additionally, the use of a hand wand digitizer to digitize the internal surface of the negative

cast also introduces error and subsequent discomforts. The internal surface of the plaster cast must consistently represent the bottom surface of the foot to be able to produce a consistently tolerable and functionally efficient foot support.

SUMMARY OF THE INVENTION

The product of the present invention is a foot support which has been prepared based upon a scan of the patient's foot, and to which ridges and grooves have been sculptured to the contour in a radial fashion resembling a Chinese fan pattern. The center of the radials of the Chinese fan is place within or outside the borders of the embodiment of the foot support and located based on the patient's activity profile. Additionally, the material selected for the foot support as well as its thickness are a function of the patient profile. All of the parameters of the patient's profile and the foot support itself can be developed by a technician at a licensed and approved location using the scanner, computer program, and milling machine contemplated for usage by the present invention. In those instances where a prescribing physician is involved, manipulations prescribed based upon perceived abnormalities in the foot or fait or other aspects of the patient can be applied to the foot support as well. Depending upon the patient's activity and the particular foot type, the present invention utilizes radially spaced ridges and grooves that converge at imaginary centers outside the foot print. This is based on the fact that all activity involving the foot on the ground causes ground reactive forces that act on the foot. The ground reactive forces of gravity cause motion of the foot on the surface the foot comes in contact with. Slippage of the foot on the surface the foot is in contact contributes to less than optimum performance, increased energy consumption and increased potential for injury. Ground reactive forces affecting the foot are multiplanar. Particular activity has particular patterns and degree of ground reactive forces acting on the foot. Particular patterns and degrees of ground reactive forces of gravity cause particular patterns or motions to occur between the foot and the surface the foot is in contact with. Grooves and ridges reduce slippage by increasing surface contact of the surfaces. Convergent-divergent grooves and ridges reduce slippage and improve control of motion in multiple planes. Direction of convergent-divergent grooves and ridges on the surface of the foot support control motion more efficiently dependent on the pattern of ground reactive forces acting on the foot in a particular activity. This is not well known to those experienced in the art. The direction of the convergent-divergent groove and ridge pattern is automatically formatted in such a manner that the CNC mill will develop the specific direction of the convergent-divergent groove and ridge pattern on the top and bottom surface of the foot support. The point of convergence on each individual foot support is determined by the particular activity chosen by the individual. The point of origin of the convergent-divergent grooves and ridges is calculated by identifying the direction of the convergent-divergent grooves and ridges in relationship to the long and transverse axis of the digitized impression of the foot support. The point of convergence will be located either within or outside the embodiment of the foot support. The point of origin will fall either medial (toward the midline of the body), lateral (away from the midline of the body) or on the longitudinal bisection of the foot support. The point of origin will fall either anterior, on or posterior to the transverse bisection of the foot support. The direction of the convergent-divergent grooves and ridges determine the exact point of convergence. Extensions of a line (groove) perpendicular to the longitudinal bisection of the foot sup-

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⑮ **BUNDESREPUBLIK
DEUTSCHLAND**



**DEUTSCHES
PATENT- UND
MARKENAMT**

⑫ **Offenlegungsschrift**
⑩ **DE 101 23 252 A 1**

⑥ Int. Cl.⁷:
A 41 D 31/02
A 41 D 19/015
A 43 B 17/00
A 63 B 71/14
A 63 B 6/00
B 32 B 3/24

⑳ Aktenzeichen: 101 23 252.7
㉑ Anmeldetag: 12. 5. 2001
㉒ Offenlegungstag: 8. 8. 2002

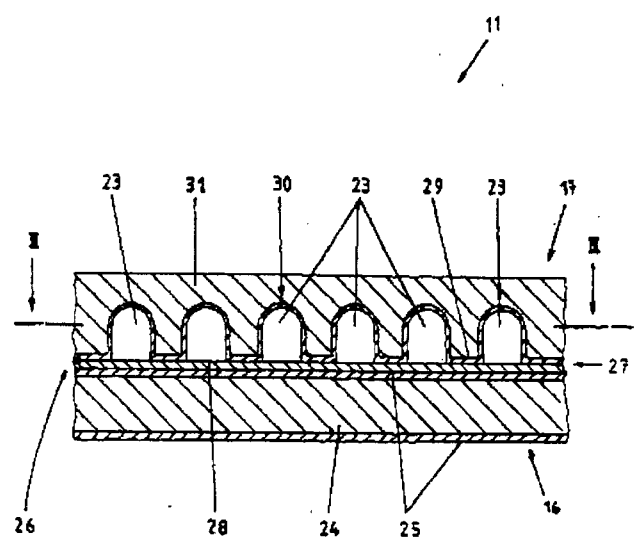
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⑥⑧ Innere Priorität: 101 05 237. 5 02. 02. 2001 101 15 582. 4 29. 03. 2001 ⑦① Anmelder: Kasdorf, Bernd, 26446 Friedeburg, DE ⑦④ Vertreter: Meissner, Bolte & Partner Anwaltssozietät GbR, 28209 Bremen	⑦② Erfinder: gleich Anmelder
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

⑥④ Flächengebilde für insbesondere einen Sporthandschuh, eine Einlegesohle oder Matte sowie Verfahren zur Herstellung des Flächengebildes

⑥⑦ Die Erfindung betrifft ein Flächengebilde (11) für insbesondere einen Sporthandschuh, eine Einlegesohle oder eine Matte sowie ein Verfahren zur Herstellung des Flächengebildes (11).
Sporthandschuhe, Einlegesohlen und Matten sollen langanhaltend über gute stoß- und schwingungsdämpfende Eigenschaften bei gleichzeitig geringer Materialstärke verfügen. Bei vorbekannten Materialien ist eine derartige Eigenschaftskombination nicht oder nur eingeschränkt möglich. Das erfindungsgemäße Flächengebilde (11) weist diese vorteilhaften Eigenschaften auf.
Um dem Flächengebilde (11) die gewünschten Eigenschaften zu verleihen, sind in der Deckmaterialschicht (17) bzw. der Grundschicht des Flächengebildes (11), die vorzugsweise aus Latexschaum gebildet ist, luftdichte Hohlkörper (23) angeordnet.
Das Flächengebilde (11) eignet sich aufgrund der durch die luftdichten Hohlkörper (23) erzielten reversiblen und langanhaltenden Kompressibilität insbesondere für Sporthandschuhe, Einlegesohlen und Matten.
Nach dem erfindungsgemäßen Verfahren zur Herstellung des Flächengebildes (11) für einen Sporthandschuh, eine Einlegesohle oder eine Matte werden auf die Grundmaterialschicht (16) luftdichte Hohlkörper (23) aufgebracht, auf die anschließend ein Material zur Bildung der Deckmaterialschicht (17), insbesondere Latexschaum (31), im fließfähigen und/oder streichfähigen Zustand aufgetragen wird, das die luftdichten Hohlkörper (23) vollständig umschließt.

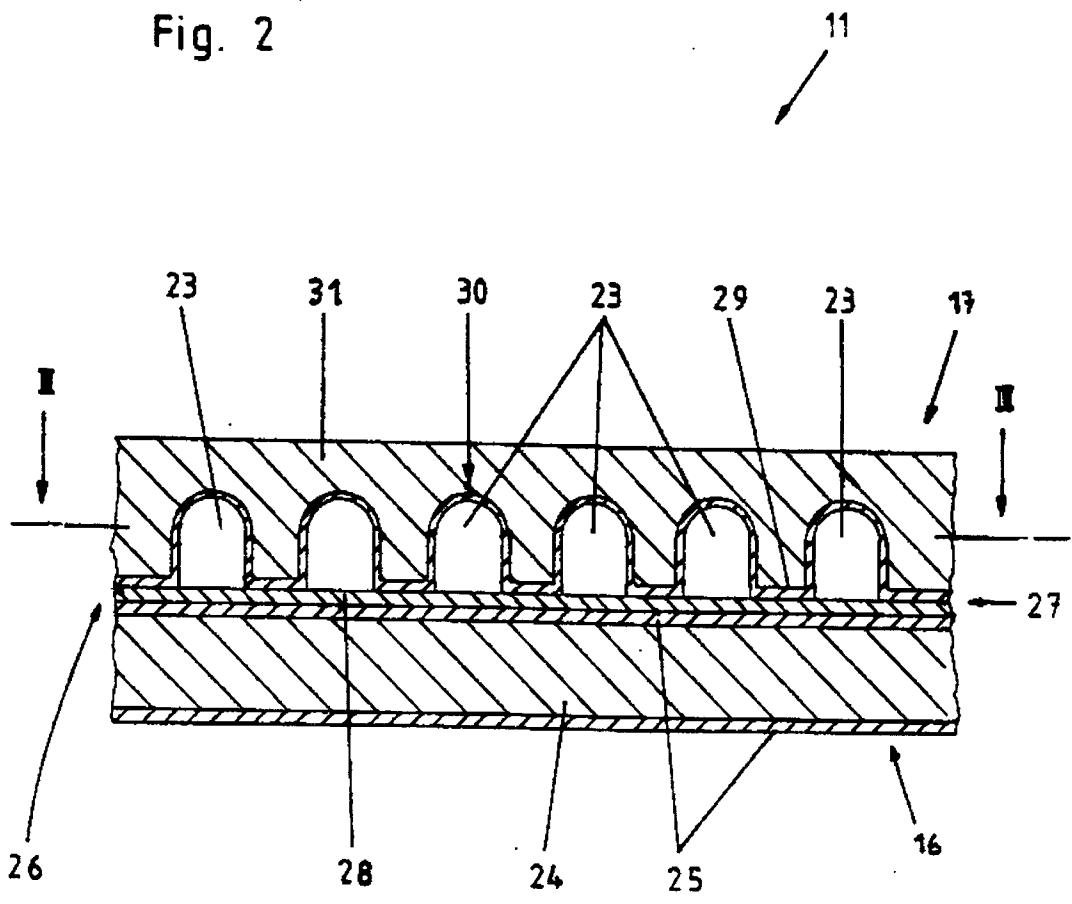


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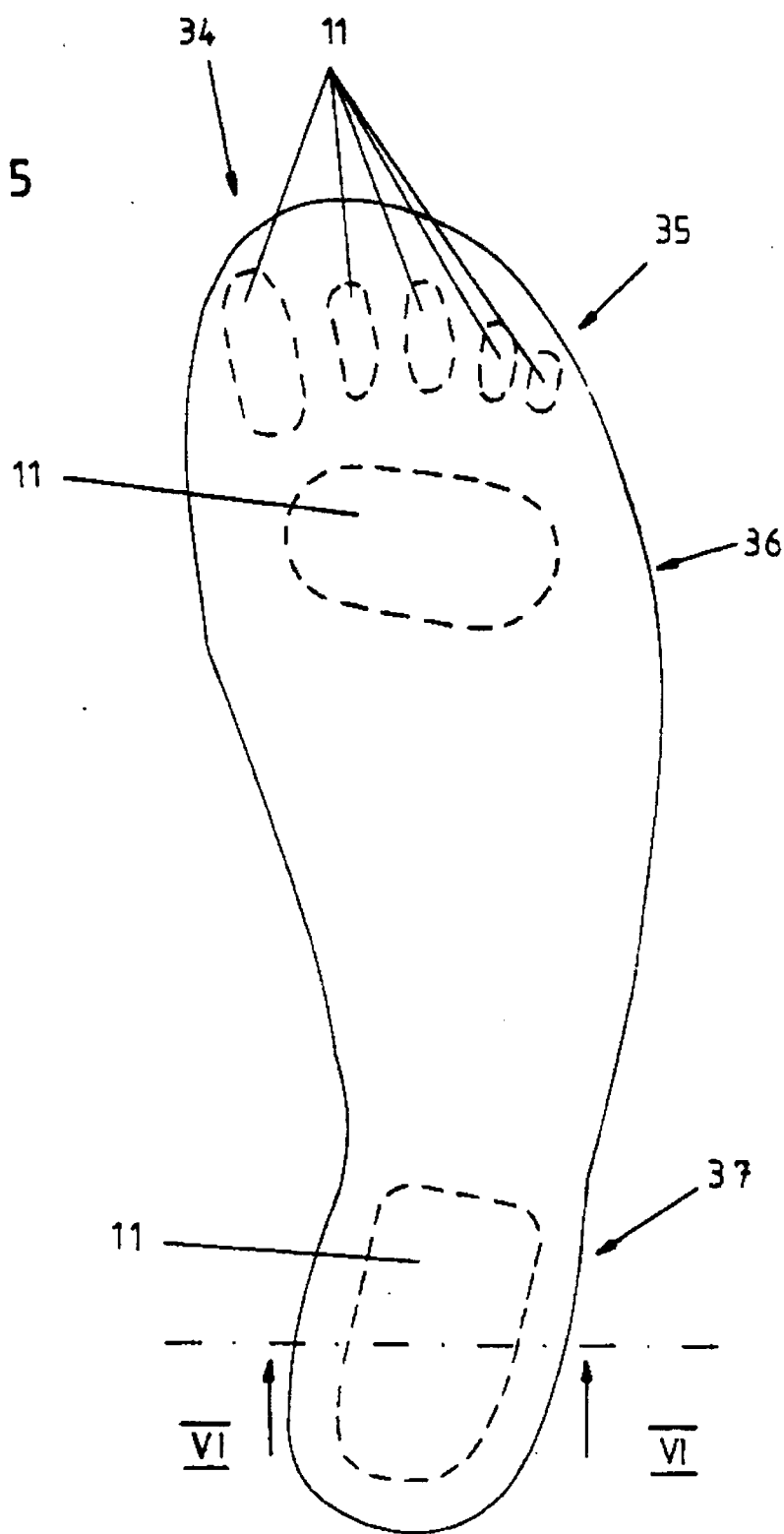
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Fig. 2



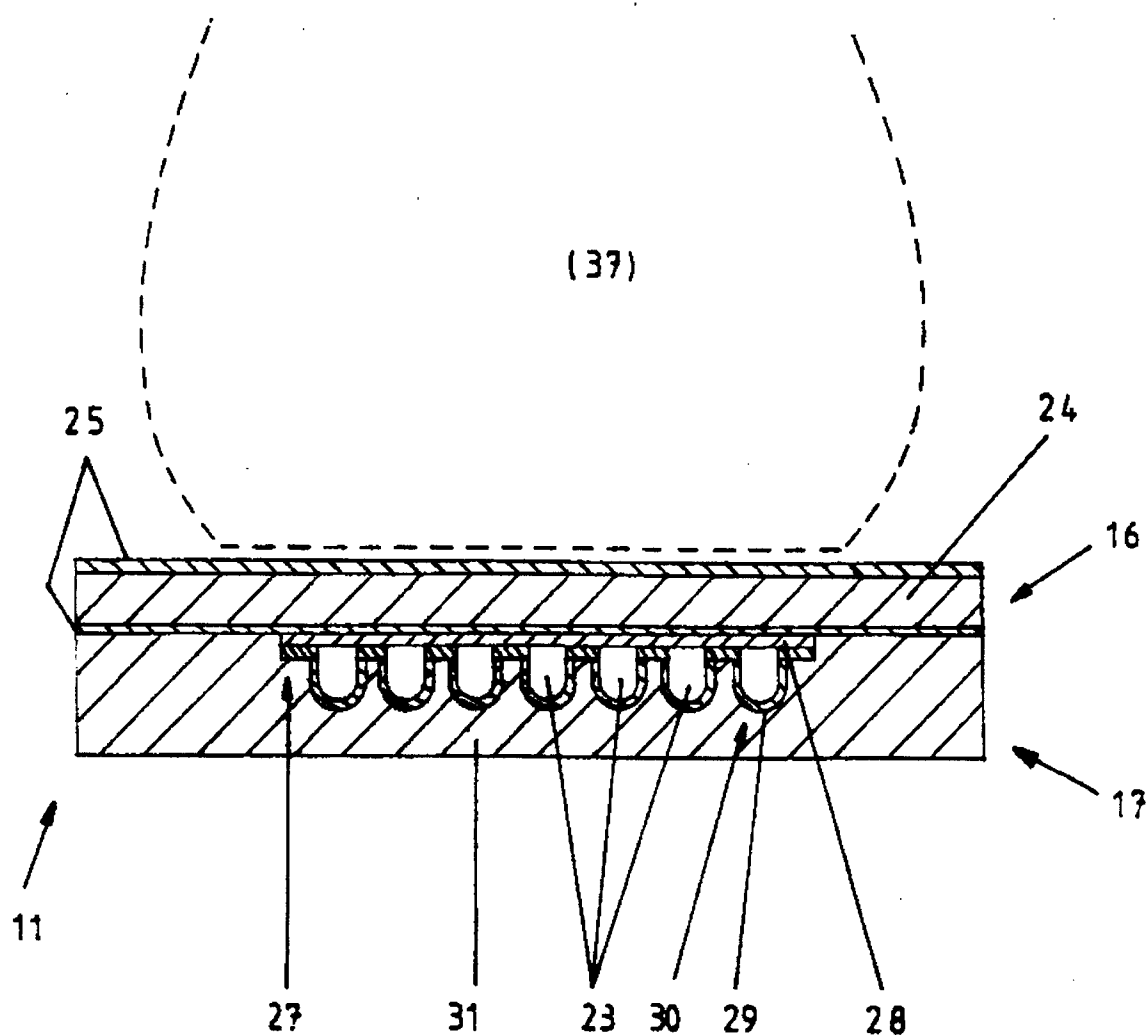
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Fig. 5



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Fig. 6





US006782641B2

(12) **United States Patent**
Turner et al.

(10) Patent No.: **US 6,782,641 B2**
(45) Date of Patent: **Aug. 31, 2004**

D8

(54) **HEEL CONSTRUCTION FOR FOOTWEAR**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 80 days.

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(22) Filed: **Aug. 12, 2002**

(65) **Prior Publication Data**

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(51) Int. Cl.⁷ **A43B 13/20; A43B 13/41;**
A43B 13/12

(52) U.S. Cl. **36/29; 36/35 B; 36/30 R**

(58) Field of Search **36/27, 35 B, 30 R,**
36/31, 141, 29

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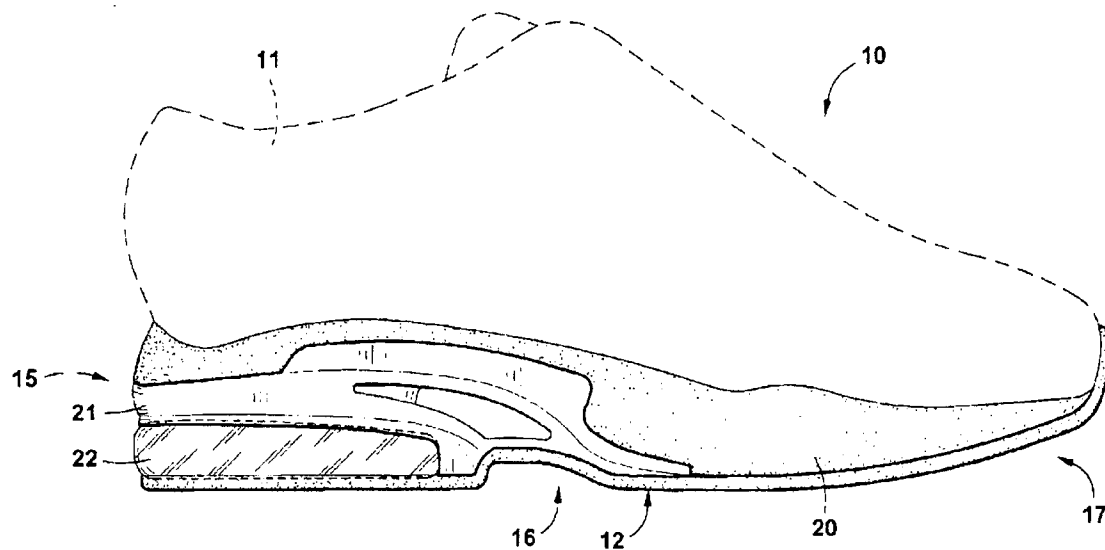
Primary Examiner—Anthony Stashick

(74) *Attorney, Agent, or Firm*—Michael A. Painter

(57) **ABSTRACT**

The present invention comprises a multilayered heel construction for footwear. A fluid-filled bladder is incorporated into the heel of footwear. The bladder defines an internal cavity which is adapted to enclose a fluid at atmospheric pressure. The internal cavity defines a peripheral channel adjacent the periphery of the bladder and a plurality of intersecting channels orientated transversely to the longitudinal axis of the footwear. The intersecting channels are in communication with the peripheral channel of the interior cavity. The bladder is positioned at the heel of the footwear and is positioned intermediate an upper footbed support. The lower surface of the multilayered heel assembly defines a concave, cantilever surface. The combination of the bladder, the upper footbed support and the lower cantilever surface improve shock absorption and the stability of the footwear.

6 Claims, 9 Drawing Sheets



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(12) **United States Patent**
Lucas et al.

(10) **Patent No.: US 7,013,582 B2**
(45) **Date of Patent: Mar. 21, 2006**

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(54) **FULL LENGTH CARTRIDGE CUSHIONING SYSTEM**

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(*) Notice: Subject to any disclaimer, the term of this
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U.S.C. 154(b) by 139 days.

(21) Appl. No.: **10/619,652**

(22) Filed: **Jul. 15, 2003**

(65) **Prior Publication Data**
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(30) **Foreign Application Priority Data**
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(51) **Int. Cl.**
A43B 13/18 (2006.01)

(52) **U.S. Cl.** **36/28; 36/29; 36/30 R**

(58) **Field of Classification Search** **36/25 R,**
36/29, 30 R, 31
See application file for complete search history.

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Primary Examiner—Ted Kavanaugh
(74) *Attorney, Agent, or Firm*—Goodwin Procter LLP

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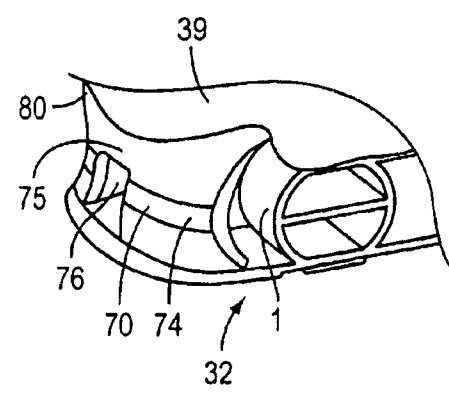
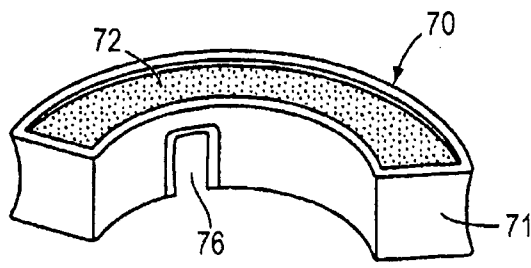
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(57) **ABSTRACT**

The invention relates to a shoe sole for an article of footwear, in particular a sports shoe. The sole includes a first area having a first deformation element and a second area having a second deformation element. The first deformation element includes a foamed material and the second deformation element includes an open-walled or honeycomb-like structure that is free from foamed materials.

32 Claims, 11 Drawing Sheets



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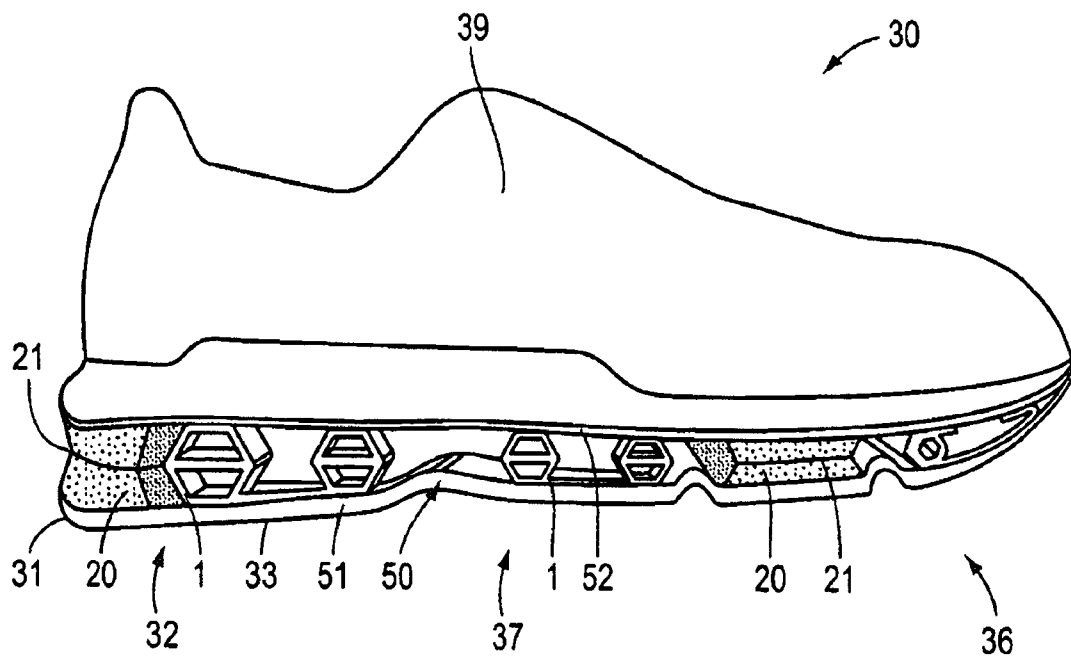
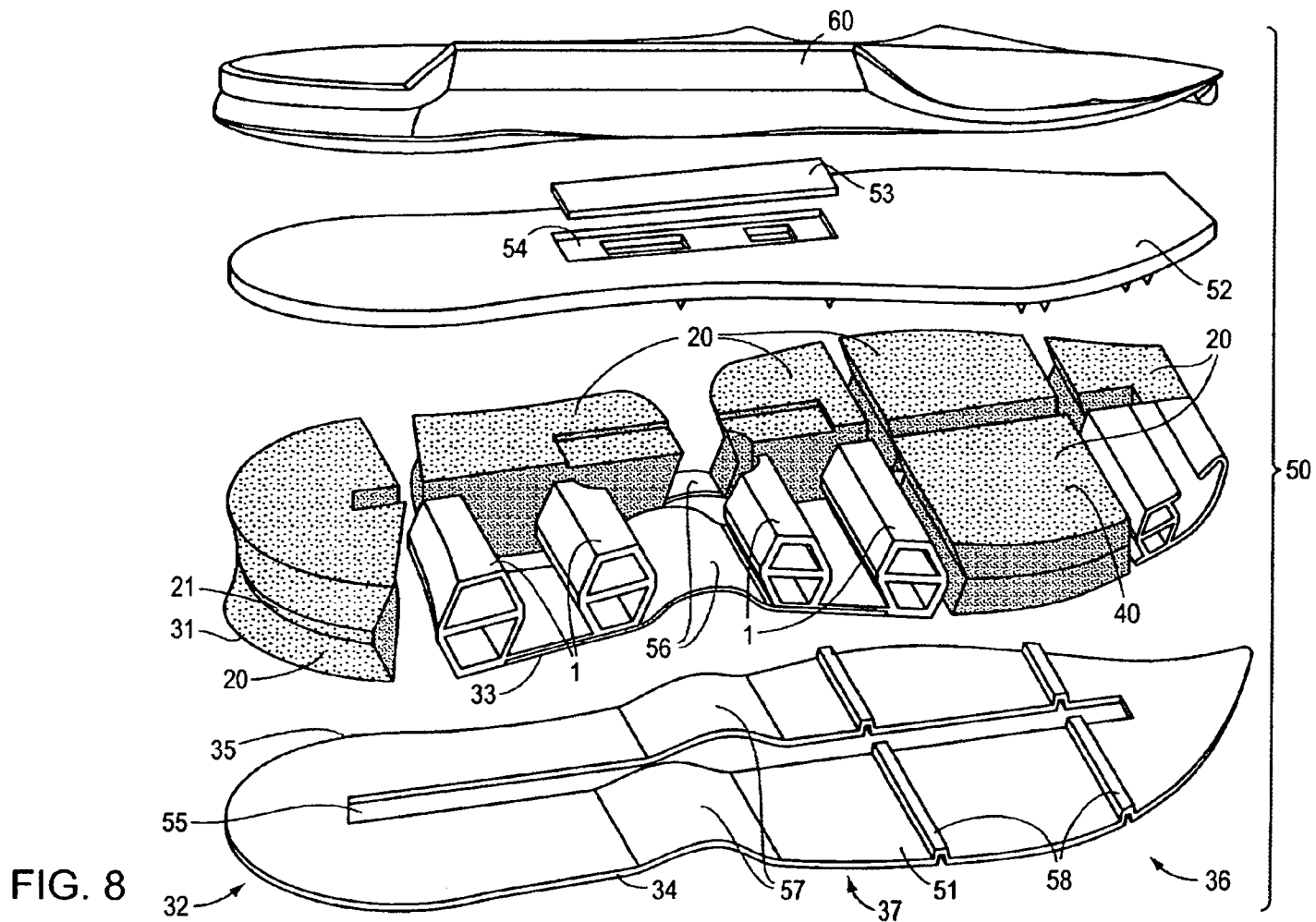


FIG. 7

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embodiment of the second deformation elements 1A, 11B shown in FIG. 5 is particularly appropriate for use in sole areas having a low height, such as, for example, at the front end of shoe sole 50.

FIGS. 6A and 6B depict the strong similarity in deformation characteristics, at a surrounding temperature of 23° C. and 60° C., respectively, between the second deformation elements 1 of the present invention and a prior art deformation element made from foamed materials. Referring to FIGS. 6A and 6B, hysteresis curves for the deflection of two different second deformation elements 1 according to the invention are shown. In a first case, the second deformation elements 1 are made from thermoplastic polyurethane (TPU) with a Shore A hardness of 80. In a second case, the second deformation elements 1 are made from TPU with a Shore A hardness of 75. For comparison purposes, a hysteresis curve for a prior art foamed deformation element made from polyurethane with an Asker C hardness of 63 is also depicted. These are typical values for deformation elements used in the midsoles of sports shoes.

In the graphs of FIGS. 6A and 6B, the force applied to the deformation elements by means of an oscillating stamp is measured along the Y-axis and the deflection of the deformation elements is measured along the X-axis. The gradient of an obtained curve indicates the stiffness of the deformation element in question, whereas the area between the increasing branch (loading) and the decreasing branch (unloading) of the curve reflects the energy loss during deformation, i.e., energy which is not elastically regained but irreversibly transformed into heat by means of, for example, relaxation processes. At 23° C. (i.e., room temperature) and at 60° C., consistency exists, to a great extent, in the behavior of the second deformation elements according to the invention and the prior art foamed element. Moreover, long term studies do not show a substantial difference in their deformation properties.

Referring now to FIG. 6C, it can be seen, however, that the behavior of the second deformation elements in accordance with the invention and the prior art foamed element is different at the low temperature of -25° C. Whereas the second deformation elements according to the invention still show a substantially elastic behavior and, in particular, return to their starting configuration after the external force is removed, the foamed deformation element of the prior art remains permanently deformed at a deflection of approximately 2.3 mm, as indicated by arrow 9 in FIG. 6C. As such, while the deformation properties of the second deformation elements in accordance with the present invention are almost independent from the ambient temperature, the deformation properties of the foamed deformation element of the prior art is not. As a result, the foamed deformation element of the prior art is not suitable for use in a shoe sole.

In contrast to the known deformation elements of the prior art, the second deformation elements in accordance with the invention can be modified in many aspects to obtain specific properties. For example, changing the geometry of the second deformation elements 1 (e.g., larger or smaller distances between the side walls 2A, 2B, the upper side 4 and the lower side 5, and/or the upper side 4' and the lower side 5'; changes to the thickness of the side walls 2A, 2B and/or the tension element 3; additional upper sides 4, 4' and/or lower sides 5, 5'; changes to the angle of the side walls 2A, 2B; and convex or concave borders for reinforcing or reducing stiffness) or using different materials for the second deformation elements enables adaptation of the second deformation elements to their respective use. For example, the second deformation elements in accordance

with the invention can be modified to take into account the particular positions of the second deformation elements within the shoe sole 50, their tasks, and/or the requirements for the shoe in general, such as, for example, its expected field of use and the size and weight of the wearer.

The various components of the second deformation elements can be manufactured by, for example, injection molding or extrusion. Extrusion processes may be used to provide a uniform shape, such as a single monolithic frame. Insert molding can then be used to provide the desired geometry of, for example, the recess 11 and the hollow volumes 7, or the hollow volumes 7 could be created in the desired locations by a subsequent machining operation. Other manufacturing techniques include melting or bonding additional portions. For example, the connecting surfaces 10 may be adhered to the upper side 4 and/or the lower side 5 of the second deformation elements 1A, 1B with a liquid epoxy or a hot melt adhesive, such as ethylene vinyl acetate (EVA). In addition to adhesive bonding, portions can be solvent bonded, which entails using a solvent to facilitate fusing of the portions to be added to the sole 50. The various components can be separately formed and subsequently attached or the components can be integrally formed by a single step called dual injection, where two or more materials of differing densities are injected simultaneously.

The various components can be manufactured from any suitable polymeric material or combination of polymeric materials, either with or without reinforcement. Suitable materials include: polyurethanes, such as a thermoplastic polyurethane (TPU); EVA; thermoplastic polyether block amides, such as the Pebax® brand sold by Elf Atochem; thermoplastic polyester elastomers, such as the Hytrel® brand sold by DuPont; thermoplastic elastomers, such as the Santoprene® brand sold by Advanced Elastomer Systems, L.P.; thermoplastic olefin; nylons, such as nylon 12, which may include 10 to 30 percent or more glass fiber reinforcement; silicones; polyethylenes; acetal; and equivalent materials. Reinforcement, if used, may be by inclusion of glass or carbon graphite fibers or para-aramid fibers, such as the Kevlar® brand sold by DuPont, or other similar method. Also, the polymeric materials may be used in combination with other materials, for example natural or synthetic rubber. Other suitable materials will be apparent to those skilled in the art.

FIG. 7 depicts one embodiment of an article of footwear 30 that includes an upper 39 and a sole 50 in accordance with the invention. FIG. 8 depicts an exploded view of one embodiment of the shoe sole 50 for the article of footwear 30 of FIG. 7. Using the second deformation elements 1 in certain sole regions and not others can create pressure points on the foot and be uncomfortable for athletes. Accordingly, as shown in FIGS. 7 and 8, a plurality of first deformation elements 20 made out of foamed materials may be arranged in particularly sensitive sole areas and a plurality of second deformation elements 1 may be arranged in other areas. The second deformation elements 1 and the first deformation elements 20 are, in one embodiment, arranged between an outsole 51 and the load distribution plate 52.

In one embodiment, one or more first deformation elements 20 made out of a foamed material are arranged in an aft portion 31 of a heel region 32 of the sole 50. Placement of the first deformation elements 20 in the aft portion 31 of the heel region 32 of the sole 50 optimally cushions the peak loads that arise on the foot during the first ground contact, which is a precondition for a particularly high comfort for a wearer of the article of footwear 30. As shown, in one embodiment, the first deformation elements 20 further

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include horizontally extending indentations/grooves 21 to facilitate deformation in a predetermined manner.

Referring still to FIGS. 7 and 8, second deformation elements 1 are, in one embodiment, provided in a front portion 33 of the heel region 32 to assist the one or more first deformation elements 20 in the aft portion 31 and to assure, in case of their failure (e.g., due to low temperatures), a minimum amount of elasticity for the shoe sole 50. Moreover, placement of the second deformation elements 1 in the front portion 33 of the heel region 32 of the sole 50 simultaneously avoids premature wear of the first deformation elements 20 in the heel region 32.

The distribution of the second deformation elements 1 and the first deformation elements 20 on the medial side 34 and the lateral side 35 of the sole 50, as well as their individual specific deformation properties, can be tuned to the desired requirements, such as, for example, avoiding supination or excessive pronation. In one particular embodiment, this is achieved by making the above mentioned geometrical changes to the second deformation elements 1 and/or by selecting appropriate material(s) for the second deformation elements 1.

FIG. 9 depicts one distribution of the deformation elements 1, 20 in accordance with an embodiment of the invention. In the forefoot region 36, foamed deformation elements 20 are arranged in areas of the sole 50 that correspond to the metatarsal heads of the wearer's foot. This region of the sole 50 is subjected to a particular load during push-off at the end of the step cycle. Accordingly, in order to avoid localized pressure points on the foot, the second deformation elements 1 are not arranged in this sole region. In one embodiment, to assist the first deformation element 20 below the metatarsal heads of the wearer's foot and to assure a correct position of the foot during the pushing-off phase, second deformation elements 1 are provided fore and aft the metatarsal heads of the wearer's foot. The second deformation elements 1 protect the first deformation element 20 against excessive loads. Simultaneously, the second deformation elements 1 allow for a more purposeful control of the series of movements of the wearer's foot during push off, thereby maintaining the neutral position of the wearer's foot and avoiding supination or pronation.

Referring again to FIG. 8, in one embodiment, providing the load distribution plate 52 above the deformation elements 1, 20 evenly distributes the forces acting on the foot over the full area of the sole 50 and thereby avoids localized peak loads on the foot. As a result, comfort for the wearer of the article of footwear 30 is increased. In one embodiment, the mid-foot region 37 can be reinforced by a light, but highly stable carbon fiber plate 53, inserted into a corresponding recess 54 of the load distribution plate 52.

In one embodiment, a gap 55 is provided in the outsole 51 and curved interconnecting ridges 56 are provided between the heel region 32 and the forefoot region 36 of the midsole 40. The curved interconnecting ridges 56 reinforce corresponding curvatures 57 in the outsole 51. The torsional and bending behavior of the sole 50 is influenced by the form and length of the gap 55 in the outsole 51, as well as by the stiffness of the curved interconnecting ridges 56 of the midsole 40. In another embodiment, a specific torsion element is integrated into the sole 50 to interconnect the heel region 32 and the forefoot region 36 of the sole 50.

In one embodiment, ridges 58 are arranged in the forefoot region 36 of the outsole 51. In another embodiment, ridges 58 are additionally or alternatively arranged in the heel region 32 of the outsole 51. The ridges 58 provide for a secure anchoring of the deformation elements 1, 20 in the

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sole 50. In one embodiment, as illustrated in FIG. 8, the sole 50 includes an additional midsole 60.

FIG. 10 depicts an alternative embodiment of an article of footwear 30 in accordance with the invention. In the illustrative embodiment shown, the second deformation elements 1 are exclusively arranged in the front portion 33 of the heel region 32 of the sole 50. In this embodiment, the forefoot region 36 and the heel region 32 have separate load distribution plates 52. Both load distribution plates 52 are bent in a recumbent U-shaped configuration, when viewed from the side, and encompass at least partially one or more deformation elements 1, 20. This structure further increases the stability of the sole 50. In one embodiment, wear resistant reinforcements 59 are arranged at a front end 38 and/or at the rear end 41 of the outsole 51.

Providing a U-shaped load distribution plate 52 is independent of the use of the second deformation elements 1. In another embodiment, second deformation elements 1 are only provided in the forefoot region 36, but, nevertheless, two load distribution plates 52, as shown in FIG. 10, are provided. In yet another embodiment, second deformation elements 1 are provided in both the heel region 32 and in the forefoot region 36. Additional examples and details of load distribution plates are found in U.S. patent application Ser. Nos. 10/099,859 and 10/391,488, now U.S. Pat. Nos. 6,722, 058 and 6,920,705, respectively, the disclosures of which are hereby incorporated herein by reference in their entireties.

In another embodiment, as illustrated in FIGS. 11 and 12, second deformation elements 1 are provided on the lateral side 35, as well as on the medial side 34, of the sole 50, contrary to the embodiment depicted in FIG. 9. In yet another embodiment, the second deformation elements 1 are provided only on the lateral side 35 of the sole 50. Additionally, a configuration of second deformation elements 1 extending from the lateral side 35 to the medial side 34 may be provided.

Referring still to FIGS. 11 and 12, the load distribution plate 52 extends along almost the entire length of the shoe sole 50, i.e., from the heel region 32 to the forefoot region 36. The first deformation elements 20 are provided in the particularly sensitive areas of the shoe sole 50, i.e., in the aft portion 31 of the heel region 32 and approximately below the metatarsal heads of a wearer's foot. The other sole areas are supported by second deformation elements 1.

FIGS. 13-14 depict a particular embodiment of a first deformation element 70 in accordance with the invention. The first deformation element 70 includes a foamed material 72. In contrast to the first deformation element 20 described above, which consists exclusively of foamed material, the first deformation element 70 is a hybrid structure that includes an outer shell 71 forming one or more cavities 77 that are filled with the foamed material 72. Thus, the superior cushioning properties of the foamed material 72 are combined with a potentially wide range of adjustment options that may be provided by varying the shape, the material, and the wall thickness of the outer shell 71. The first deformation element 70 is illustrated as it is used in the rearmost portion of the heel region 32. The first deformation element 70, including the outer shell 71 and the foamed material 72, may, however, also be used in other parts of the shoe sole 50, in a similar manner to the above described first deformation elements 20.

The outer shell 71 serves several purposes. First, the outer shell 71 provides cushioning in a manner similar to the second deformation elements 1, due to its own elastic deflection under load. In addition, the outer shell 71 contains the foamed material 72 arranged therein and prevents the

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(12) **United States Design Patent** (10) **Patent No.:** **US D518,285 S**
Schoenborn et al. (45) **Date of Patent:** **** Apr. 4, 2006**

(54) **FOOTWEAR SOLE**

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(**) **Term:** **14 Years**

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(51) **LOC (8) Cl.** **02-99**

(52) **U.S. Cl.** **D2/977**

(58) **Field of Classification Search** D2/896,
D2/909-912, 946, 972, 977; 36/78
See application file for complete search history.

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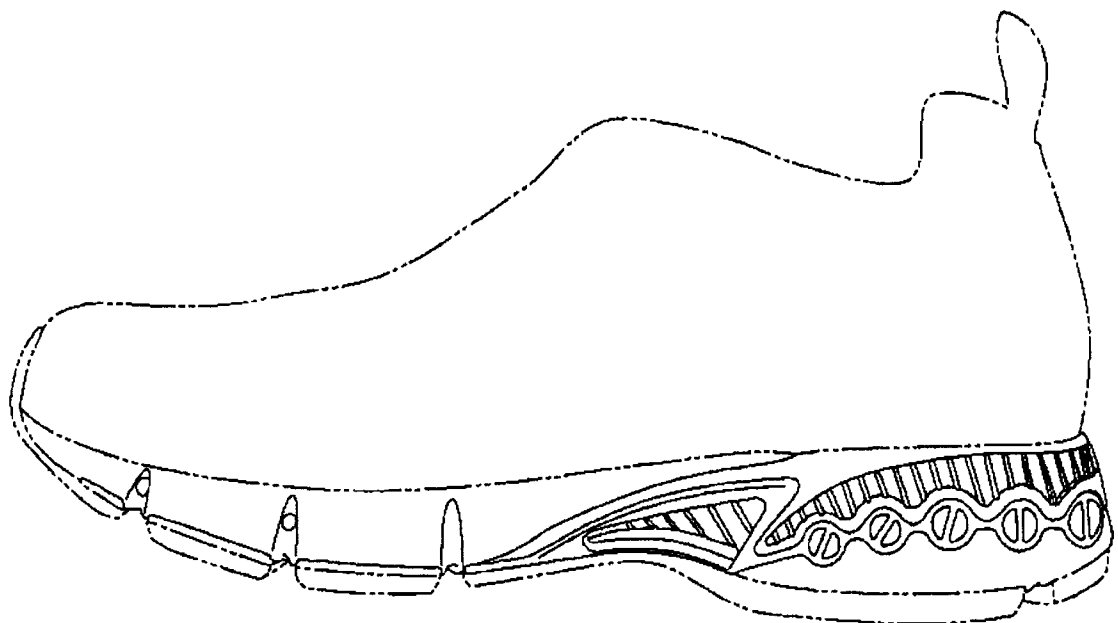
(57) **CLAIM**

The ornamental design for footwear sole, as shown and described.

DESCRIPTION

FIG. 1 is a perspective view of the footwear sole embodying the new design;
FIG. 2 is a right side view thereof;
FIG. 3 is a left side view thereof;
FIG. 4 is a front view thereof; and,
FIG. 5 is a rear view thereof.
FIGS. 1-5 show features of an article of footwear in phantom lines. These features are shown for environmental purposes and do not form any part of the claimed design. Further, the phantom lines immediately adjacent the solid-line portions of the design form the boundary of the design, with the phantom lines forming no part of the claimed design.

1 Claim, 3 Drawing Sheets



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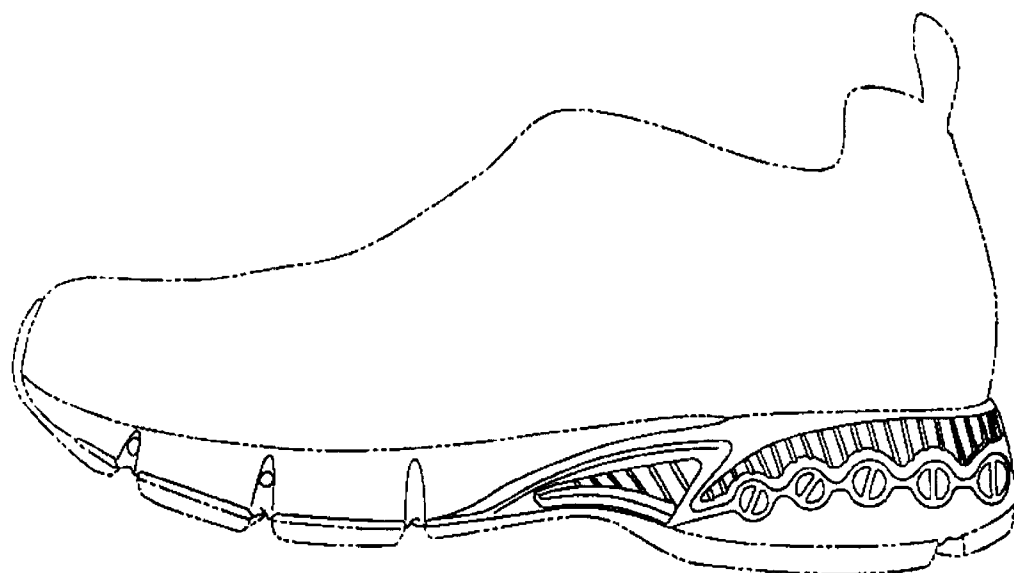


Fig. 2

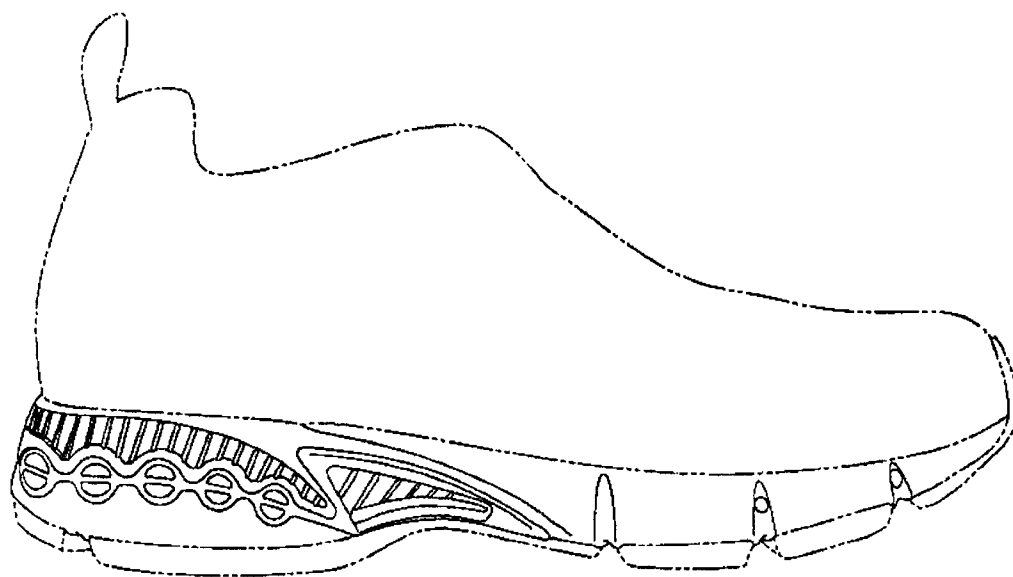


Fig. 3