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(72) Inventor: **Johnston, Craig Peter**
103 Sloane Street, London SW1X9PP (GB)

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(74) Representative: **Palmer, Jonathan Richard et al**
Boult Wade Tennant,
Verulam Gardens,
70 Gray's Inn Road
London WC1X 8BT (GB)

(71) Applicant: **Couchman Harrington Associates**
London WC1A 2LQ (GB)

(54) **Article of footwear and detachable cover**

(57) There is disclosed a detachable ball control skin for use on an article of footwear to improve grip and purchase on a ball. The skin comprises a ball control region having ball control elements disposed thereon.

One or more fastening elements are also provided for retaining the skin on the article of footwear.

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Description

Background of the Invention

Field of the Invention

[0001] The present invention relates generally to athletic footwear. More particularly, this invention relates to athletic footwear used in soccer or other sports which require kicking and/or dribbling of a ball with the wearer's feet, and detachable covers for the same.

Related Art

[0002] Soccer shoes are used by a wearer to dribble, kick and pass a ball. In each function, it is beneficial for the wearer to be able to handle and control the ball easily and effectively with the soccer shoe. It is also beneficial to have a soccer shoe that enables the wearer to impart spin and increase power to the ball as it is kicked. Further, a soccer shoe that improves a wearer's ability to control and kick the ball as environmental conditions become adverse, such as when it is cold, wet and/or muddy, is crucial to a wearer's consistent performance.

[0003] In light of the above, numerous attempts have been made over the years to incorporate into a soccer shoe some type of ball handling surface attached to the shoe upper that provides a wearer with better grip and purchase of a ball. In U.S. Patent No. 3,191,321 to Brutting, rubber projections were inserted through holes in the toe portion and medial and lateral vamp portions of the soccer shoe upper to form a ball control surface. This arrangement attempted to address problems of prior shoes of this type i.e., unsatisfactory shape of projections, construction and method of securing the projections to the upper. Whereas the rubber projections of the shoe of U.S. Patent No. 3,191,321 are such as to perhaps improve ball contact and control, they may have the adverse effect of dampening a wearer's power kick due to the compressibility of the material contacting the ball.

[0004] The design of the soccer shoe in U.S. Patent No. 5,437,112 to Johnston includes rubber formations applied over flat and/or concave ball contact areas. The effectiveness of the ball contact areas of U.S. Patent No. 5,437,112 is premised on the "squaring-off" of the toe box so that the shoe has increased surface area on the inner medial and lateral shoe vamp. The rubber formations on the ball control surface are comprised of either thinner, flexible rubber to provide flexibility and feel to the wearer for improved dribbling and ball control or of rubber of sufficient thickness to remain stable for power kicking. In order to get both effects in one shoe, it is necessary for a wearer to secure a harder, thicker kicking attachment to a "dribbling" shoe. Thus, the design of the shoe does not readily accommodate a soccer player's need for a soccer shoe that will aid the wearer in dribbling and controlling the ball as well as power kicking

and passing the ball.

[0005] Accordingly, what is needed is a soccer shoe which incorporates a ball control system that includes a means to provide adequate dribbling and controlling features to the wearer and means of applying or increasing power or influence over the ball during kicking and passing. In addition, the ball control system must be integrated into the soccer shoe in such a manner as to not impede a player's speed by being too heavy or cumbersome.

Summary of the Invention

[0006] To achieve the foregoing and other objects, and in accordance with the purposes of the present invention as embodied and broadly described herein, the article of footwear of the present invention comprises a ball control and influence system. The system of the present invention includes a ball control region that is comprised of three interrelated materials serving three different functions that is disposed on an outer surface of a soccer shoe upper.

[0007] The soccer shoe of the present invention enables the wearer to control the ball while dribbling and to achieve rapid control of the ball upon receipt of a pass. The soccer shoe also provides means of applying or increasing power and influence over the ball while power kicking and passing. Due to the relative movement between the ball control region and the outer surface of the upper upon contact with a ball and the composition of the ball control region, the soccer shoe allows the wearer to impart spin or other forms of induced movement of the ball so as to selectively vary the flight of the ball.

[0008] The soccer shoe of the present invention includes a ball control region attached to an outer surface of the upper. The ball control region is comprised of a series of raised geometric protrusions constructed of three layers of interrelated materials. The material of each layer is chosen to perform a specific function so that in unison the three layers allow a wearer to impart a variety of desired effects on the ball.

[0009] The outer layer is comprised of a soft and pliable rubber that deforms easily and provides grip when in contact with a ball. The gripping nature of the outer layer acts like tentacles to both attract and slow down the ball when receiving it and then keeping it steady when preparing to shoot. The outer layer is tactile so that the wearer is able to feel the ball to effectively dribble and carry it down the field under any environmental condition.

[0010] The inner middle layer is comprised of a harder, more resilient rubber compound than that of the outer layer. The inner middle layer in conjunction with the outer layer deforms around the outer surface of a ball to enhance or over-emphasize the particular effect that the wearer wants to achieve with the ball. Thus, a wearer can more effectively make short passes and/or maneu-

ver about other players by applying greater force between the ball control region and the ball surface and deforming the inner middle layer of material.

[0011] The core layer is comprised of a very thin layer of high tensile metal or plastic. This area provides a wearer with the means of applying and/or increasing power and influence to the ball. A wearer is able to achieve an extra belt of power and effect when the three layers of the ball control region are deformed in unison during hard contact with the ball.

[0012] In another embodiment of the present invention, the ball control region is comprised of a series of raised geometric protrusions of various sizes that are arranged on the soccer shoe upper in a manner that allows the wearer to impart a variety of desired effects on the ball, such as imparting more spin to the ball. Each geometric protrusion is made of a single rubber material, however the type of rubber compound used for the geometric protrusions varies with its placement on the soccer shoe upper. Thus, the rubber material selected for the geometric protrusions around the throat of the upper has a different density/hardness than the rubber material selected for the geometric protrusions which cover the lateral and medial sides of the soccer shoe upper.

[0013] The invention may be put into effect as a detachable skin for fastening by a user to a sports shoe. The skin may be secured, in part or in whole by any combination of elasticity and tension in the skin, part of the skin passing under the sole of the shoe, shoe studs, especially studs on the sole, being secured over the skin which is provided with apertures for this purpose, one or more heel straps and fastenings to attach to the shoe in the tongue or lace-up region.

[0014] The invention also provides a ball control surface for sports footwear having gripper or ball teeth made of rubber and/or compounds designed in combination with specific geometries that bite into a ball as it is kicked forward. The control surface may comprise a series of raised pyramids spaced equidistantly, and constructed of three different but interrelated materials having different functions.

[0015] Preferably, the outer surface is of a very soft and pliable rubber that deforms easily and has the property of acting like tentacles to both attract and slow a ball down when receiving it and then keeping it steady when preparing for a kick. It is very desirable for the ball to stay in contact with the ball control surface for as long as possible. The "tentacles" have properties which make this possible.

[0016] The inner material is of a harder and more nervous rubber or other resilient compound which acts in conjunction with the outer rubber to deform around the surface of the ball and to then enhance or over emphasize the particular effect that the player wants to achieve with the ball.

[0017] The core material is made of a thin but high tensile metal or plastic. This part effects energy and nervousness which can give a critical brief (millisec-

onds) belt of extra power and effect.

[0018] Further features and advantages of the present invention, as well as the structure and operation of various embodiments of the present invention, are described in detail below with reference to the accompanying drawings.

Brief Description of the Drawings

[0019] The accompanying drawings, which are incorporated herein and form part of the specification, illustrate the present invention and together with the description further serve to explain the principles of the invention and to enable a person skilled in the pertinent art to make and use the invention.

[0020] FIG. 1 is a lateral side view of one embodiment of an article of footwear in accordance with the present invention.

[0021] FIG. 2 is a top plan view of a geometric protrusion of FIG. 1.

[0022] FIG. 2a is a cross-sectional view taken along line 2A-2A of Fig. 2.

[0023] FIG. 3 is a top plan view of a series of geometric protrusions of FIG. 1.

[0024] FIG. 3a is a cross-sectional view taken along line 3A-3A of Fig. 3.

[0025] FIG. 4 is a cross-sectional view of a series of geometric protrusions of FIG. 1 in a relaxed state.

[0026] FIG. 5 is a cross-sectional view of a series of geometric protrusions of FIG. 1 wherein an outer layer is deformed under soft contact with a ball.

[0027] FIG. 6 is a cross-sectional view of a series of geometric protrusions of FIG. 1 wherein an outer layer and an inner middle layer are deformed under hard contact with a ball.

[0028] FIG. 7 is a medial side view of a second embodiment of an article of footwear in accordance with the present invention.

[0029] FIG. 8 is a lateral side view of the article of footwear of FIG. 7.

[0030] FIG. 9 is a top view of the article of footwear of FIG. 7.

[0031] FIG. 10 is a top plan view of the ball control region (shell?) of FIG. 7.

[0032] FIG. 11 is a side view of a detachable ball control skin.

[0033] FIG. 12 is an underside view of the skin of FIG. 11.

Detailed Description of the Preferred Embodiments

[0034] Preferred embodiments of the present invention will now be described with reference to the figures where like reference numbers indicate identical or functionally similar elements. While specific configurations and arrangements are discussed, it should be understood that this is done for illustrative purposes only. A person skilled in the relevant art will recognize that other

configurations and arrangements can be used without departing from the spirit and scope of the invention. It will be apparent to a person skilled in the relevant art that this invention can also be employed in a variety of other applications.

[0035] A lateral side view of soccer shoe 100 embodying the present invention is shown in FIG. 1. Soccer shoe 100 has upper 102 and sole 104 provided with studs 106. Upper 102 may be made of leather. In another embodiment of the present invention, upper 102 may be made of any suitable synthetic material, including a combination of fabric and plastic. Sole 104 and studs 106 are integrally formed of plastic in an injection molding process. In another embodiment, sole 104 and studs 106 may be formed separately and attached one to the other in any means apparent to a person skilled in the relevant art given the present description and application.

[0036] Ball control region 108 is attached to upper 102 and is comprised of a series of geometric protrusion 110 formed in rows. In another embodiment of the present invention, ball control region 108 may be formed integrally with upper 102. Each geometric protrusion 110 is generally pyramidal and of substantially equal dimensions. The geometry and size of geometric protrusion 110 provides multidirectional performance for the wearer. Ball control region 108 wraps around the outer surface of upper 102 below fastening portion 112 such that a ball may be controlled about this entire region. In another embodiment of the present invention, geometric protrusions may be of various shapes and dimensions and formed about the ball control region in any suitable arrangement in keeping with the present description and application.

[0037] As shown in FIGs. 2, 2A, 3 and 4, ball control region 108 may be formed of three distinct and interrelated layers. Outer layer 202 is formed of a soft and pliable rubber that deforms easily and has the property of acting like tentacles to both attract and slow the ball down when receiving it and then keeping it steady when preparing to shoot. (It is very desirable for accuracy of the kick that the ball stays on the foot for as long as possible, the outer layer has properties to make this possible.) One preferred material is a rubber compound having a Shore hardness of between 60A and 64A. Inner middle layer 204 is formed of a much harder and more resilient rubber compound than outer layer 202. One suitable material is a rubber compound having a Shore hardness of between 49A and 53A. As shown in FIGs. 5 and 6, inner middle layer 204 acts in conjunction with outer layer 202 to deform around the surface of ball 502 to enhance or over-emphasize the particular effect that the wearer wants to put on the ball. Core layer 206 is formed of a very thin high tensile metal or plastic. Core layer 206 creates the real energy and resiliency of ball control region 108 that during a kick gives a belt of extra power and effect while imparting spin on the ball.

[0038] Although the above-described embodiment

suggests the use of three separate materials for geometric protrusions 110, it may be possible to use a single material with a density that varies from a less dense outer region to a denser inner region. It is also envisioned that for some applications, two materials may be used to accomplish some of the same goals as the three layer geometric protrusion of ball control region 108. Similarly, the ball control region can be tailored for particular functionality by utilizing a fourth material or more.

[0039] FIGS. 7 through 10 show an alternate embodiment of the present invention. Soccer shoe 700 has upper 702 and sole 704 provided with studs 706. Ball control region 708 is attached to an outer surface of upper 702 and is comprised of geometric protrusions 710 that are generally conical. Conical protrusions 708 vary in height from 3 mm to 7 mm and in base diameter from 3 mm to 6 mm, as represented in FIG. 10.

[0040] Ball control region 708 is arranged such that it defines ball pockets 712 on the outer surface of upper 702. Shorter conical protrusions 710 are arranged directly adjacent ball pockets 712 with taller conical protrusions 710 positioned in step fashion about ball control region 708 such that the curved surface of the ball is accommodated within ball pockets 712.

[0041] Conical protrusions 710 of ball control region 708 are each formed of a single rubber compound. However, the properties of the rubber compound used to produce the conical protrusions varies with which region of ball control surface 708 the conical protrusions are to be placed on soccer shoe upper 702. As shown in FIGS. 9 and 10, ball control region 708 is comprised of a throat region 714, a medial region 716 and a lateral region 718 wherein the rubber compound used to manufacture the conical protrusions thereon varies from region to region. Particularly, the rubber used for the "U-shaped" throat region 714 of ball control region 708 is of a harder rubber material, such as PGM 44 with a Shore hardness of 50A, which allows a wearer to increase the power and influence over the ball when the ball is kicked from within this region of the shoe. In contrast medial and lateral regions 716 and 718 of ball control region 708 are made of a softer rubber material, such as PGM 50 with a Shore hardness of 62A, which slightly deforms around the surface of a ball to allow the wearer to enhance or over-emphasize the particular effect that the wearer wants to achieve with the ball, by keeping the ball on the wearer's foot longer.

[0042] Ball control region 108 may also be removable from the upper to allow ball control regions having different characteristics to be interchanged on a single upper. For example, the ball control region could be attached with snaps, a hook and pile fastener or in any other convenient manner. Individual geometric protrusions might also be replaceable so that an individual soccer player may tailor his/her ball control region to suit his/her individual needs or desires.

[0043] Figure 11 illustrates a further embodiment of the present invention. A detachable ball control skin

(800) is shown (solid lines) in the context of an item of footwear (802) such as a football boot (broken lines) on which it may be used. The detachable skin 800 may have any of the features of the ball control region or regions described above, including suitable combinations of geometric protrusions being constructed of multiple layers and/or having properties which vary between different parts of the detachable skin.

[0044] The detachable skin may be attachable to a boot in a variety of ways. In the embodiments of figure 11, one or more straps or continuations of the skin material pass underneath the sole of the boot. Apertures in these straps accept mountings for studs 804, which are then screwed down or otherwise fastened over the straps to help keep the skin in place. The straps may be so held by one, two, or more studs 804, in particular, such studs as are conventionally fitted, moulded, or removably attached to the sole of football or soccer boots. In figure 12 the underside of boot 802 is shown (broken lines). Strap elements 806 of the skin 800 are illustrated passing under four studs (804) in the front portion of the boot sole.

[0045] A heel strap 808 may also be used. Such a heel strap is shown in figure 11, passing from each side of the main portion of the skin to the rear of the boot. An adjuster or fastener 810 may be provided on the heel strap. Further tongue fasteners 812 may be provided to secure the skin in the region of the tongue, or the laces or other fasteners of the boot.

[0046] A user may attach ball control skin 800 to an existing boot by removing some of the boot studs 804, stretching the skin over the boot and locating the appropriate apertures in the skin over the stud attachment means, fastening the heel strap and refixing the studs over the skin.

[0047] The skin 800 is preferably provided with one or more of the apertures as illustrated in figure 10. Between a top aperture 814 and a side aperture on one or both sides of the boot the skin may therefore be in the form of a narrow region or neck 818 between two apertures. The skin is preferably formed from one or more elastic or resilient materials so that it can be stretched over the boot and held in place under tension. Because the neck 818 on either side of the boot is not attached directly to the boot surface it is able to move somewhat when under pressure from the impact of a ball. The degree of movement depends partly on the elasticity of the skin material and on the tension of the skin on the boot. Movement of either neck acts to absorb energy from the impact of the boot on a ball and to reimport that energy to the ball in a "catapult" or spring-back action. This effect may be enhanced by providing a low friction material on the undersurface of the skin in either neck region 818, such as nylon.

[0048] The projections on the skin may be arranged around the upper aperture, or any of the side apertures, to form a level or even a concave ball control region. In particular, the projections adjacent to an aperture may

be relatively smaller than projections spaced slightly away from the same aperture. In this way the projections can form a "cradle" for improved ball contact and control.

[0049] The detachable ball control skin may be formed so as to allow its movement relative to substantially any part of the shoe upper with which it is in contact, for example by provision of a friction reducing material over most or all of the upper shoe engaging surface. A high friction outer for good ball contact and low friction liner for increased movement between the skin and the boot provides enhanced control of the ball, giving the users' ankle valuable or critical time to perfect an action. The above discussed "catapult" effect of relative movement may apply not just to any necks of skin material but to any or all parts of the skin.

[0050] The projections positioned around the sweet spot or kicking point apertures can be used to form ball-accepting concave or flat regions with relatively little weight added to the users' foot. The resilient projections provide a wall for purchase of the ball and allow more margin for user ball-control error. The positioning of the projections around the sweet-spot apertures provides benefits to the user in terms of ball contact time, grip and purchase. Different rubbers and other resilient materials may be used to allow for different weathers and conditions. Elasticity may be tailored to optimize the movement of the skin relative to the shoe, for example by using different elasticities in different parts of the skin. All of the above in combination provide a user with much improved ball control.

[0051] While various embodiments of the present invention have been described above, it should be understood that they have been presented by way of example, and not limitation. It will be apparent to persons skilled in the relevant art that various changes in form and detail can be made therein without departing from the scope of the invention. Thus the present invention should not be limited by any of the above-described exemplary embodiments, but should be defined only in accordance with the following claims. All cited patent documents and publications in the above description are incorporated herein by reference.

Claims

1. A detachable ball control skin for use on an article of footwear to improve grip and purchase on a ball, comprising:
 - a ball control region;
 - ball control elements disposed on said ball control region; and
 - one or more fastening elements for retaining the skin on the article of footwear.
2. The detachable ball control skin of claim 1 wherein the one or more fastening elements comprise one

- or more sole strap regions arranged to pass under the sole of the article of footwear.
3. The detachable ball control skin of claim 1 or 2 wherein at least one of the sole strap regions is provided with one or more apertures for location upon a stud or stud fixing of the article of footwear. 5
 4. The detachable ball control skin of any preceding claim wherein the one or more fastening elements comprise a heel strap. 10
 5. The detachable ball control skin of any preceding claim wherein the ball control skin comprises one or more neck regions arranged to stretch upon impact of a ball so as to provide a catapult action. 15
 6. The detachable ball control skin of claim 5 wherein the neck regions are adapted to move independently of the underlying footwear. 20
 7. The detachable ball control skin of claim 5 or 6 wherein the skin is provided with a low friction surface in the vicinity of the neck region for increasing relative movement of the neck region and the underlying footwear. 25
 8. The skin or any preceding claim wherein the ball control region is comprised of a plurality of interrelated layers, one of said layers including a material of a different hardness than another of said layers. 30
 9. The skin of any preceding claim, wherein said ball control region is adapted to cover a substantial portion of an upper of the article of footwear. 35
 10. The skin of any preceding claim, wherein said ball control region comprises a series of geometric protrusions. 40
 11. The skin of claim 10, wherein the geometric protrusions are generally conical.
 12. The skin of claim 10, wherein the geometric protrusions are generally pyramidal. 45
 13. The skin of claim 11 or 12, wherein each of the geometric protrusions are of substantially equal dimensions. 50
 14. The skin of claim 11 or 12, wherein the geometric protrusions are of varying dimension.
 15. The skin of any of claims 11 to 14, wherein the geometric protrusions are spaced equidistant apart and formed in rows. 55
 16. The skin of any of claims 8 to 15, wherein said plurality of interrelated layers of said ball control region further comprises:
 - an outer layer that contacts the ball;
 - a core layer that is disposed on said outer surface of the upper; and
 - an inner middle layer sandwiched between said outer layer and said core layer.
 17. The skin of any of claim 16, wherein said outer layer comprises a soft rubber that deforms easily, said core layer comprises a high tensile metal or plastic, and said inner middle layer comprises a harder rubber than said outer layer.
 18. The skin of any of preceding claim wherein the ball control region is comprised of a throat region, a medial region and a lateral region, wherein one of said throat, medial or lateral regions includes a material of a different hardness than another of said regions.
 19. The skin of any preceding claim, wherein said ball control region comprises a series of geometric protrusions arranged to form a plurality of ball pockets.
 20. The skin of any preceding claim, wherein said geometric protrusions are of varying dimension such that said geometric protrusions which are adjacent said ball pockets are smaller in area than said geometric protrusions about a remainder of said ball control region.
 21. The skin of any preceding claim, wherein said geometric protrusions in said throat region are formed from rubber with a Shore hardness of about 50A.
 22. The skin of any preceding claim, wherein said geometric protrusions in said medial and lateral regions are formed of rubber with a Shore hardness of about 62A.
 23. A detachable ball control skin for use on an article of footwear to improve grip and purchase on a ball substantially as herein described with reference to the accompanying drawings.
 24. An article of footwear comprising a non-detachable ball control skin having the features of any preceding claim.
 25. An article of footwear to provide grip and purchase on a ball comprising:
 - a sole;
 - an upper disposed on said sole and having an outer surface; and
 - a ball control region attached to said outer surface of said upper comprised of a plurality of

- interrelated layers, wherein one of said layers includes a material of a different hardness than another of said layers.
- 26.** The article of footwear of claim 25, wherein said ball control region covers a substantial portion of said upper.
- 27.** The article of footwear of claim 25 or 26, wherein said ball control region comprises a series of geometric protrusions.
- 28.** The article of footwear of claim 27, wherein the geometric protrusions are generally conical.
- 29.** The article of footwear of claim 27, wherein the geometric protrusions are generally pyramidal.
- 30.** The article of footwear of any of claims 27 to 29, wherein each of the geometric protrusions are of substantially equal dimensions.
- 31.** The article of footwear of any of claims 27 to 29, wherein the geometric protrusions are of varying dimension.
- 32.** The article of footwear of any of claims 27 to 31, wherein the geometric protrusions are spaced equidistant apart and formed in rows.
- 33.** The article of footwear of any of claims 25 to 32, wherein said plurality of interrelated layers of said ball control region further comprises:
- an outer layer that contacts the ball;
 - a core layer that is disposed on said outer surface of the upper; and
 - an inner middle layer sandwiched between said outer layer and said core layer.
- 34.** The article of footwear of claim 33, wherein said outer layer comprises a soft rubber that deforms easily, said core layer comprises a high tensile metal or plastic, and said inner middle layer comprises a harder rubber than said outer layer.
- 35.** An article of footwear to provide grip and purchase on a ball comprising:
- a sole;
 - an upper disposed on said sole and having an outer surface; and
 - a ball control region attached to said outer surface of said upper comprised of a throat region, a medial region and a lateral region, wherein one of said throat, medial or lateral regions includes a material of a different hardness than another of said regions.
- 36.** The article of footwear of claim 35, wherein said ball control region covers a substantial portion of said upper.
- 37.** The article of footwear of claim 35 or 36, wherein said ball control region comprises a series of geometric protrusions arranged to form a plurality of ball pockets.
- 38.** The article of footwear of any of claims 35 to 37, wherein said geometric protrusions are generally conical.
- 39.** The article of footwear of any of claims 25 to 38, wherein said geometric protrusions are of varying dimension such that said geometric protrusions which are adjacent said ball pockets are smaller in area than said geometric protrusions about a remainder of said ball control region.
- 40.** The article of footwear of any of claims 35 to 39, wherein said geometric protrusions in said throat region are formed from rubber with a Shore hardness of about 50A .
- 41.** The article of footwear of any of claims 35 to 39, wherein said geometric protrusions in said medial and lateral regions are formed of rubber with a Shore hardness of about 62A.
- 42.** An article of footwear according to any of claims 25 to 34, further comprising the features of any of claims 35 to 41.
- 43.** An article of footwear substantially as herein described with reference to the accompanying drawings.

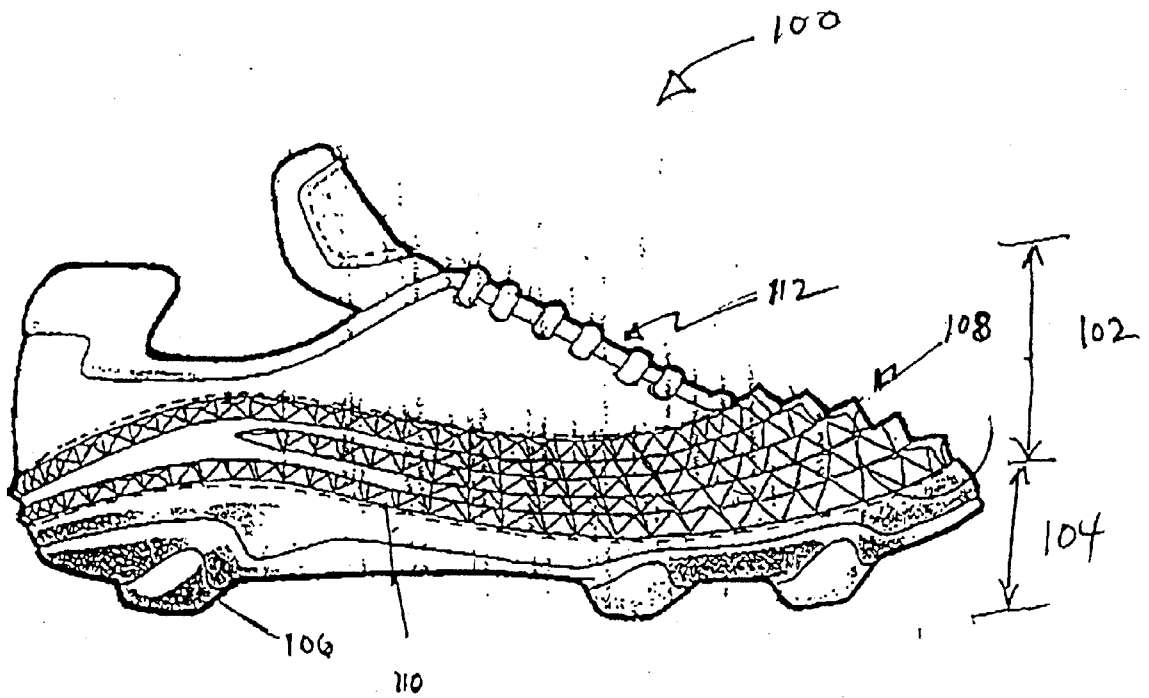


FIG. 1

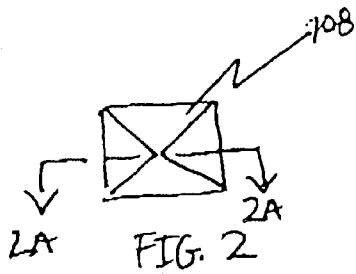


FIG. 2

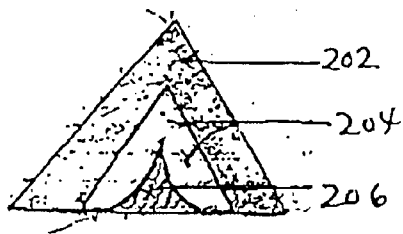


FIG. 2A

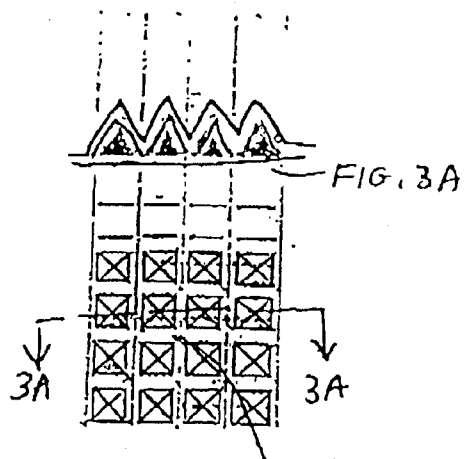


FIG. 3

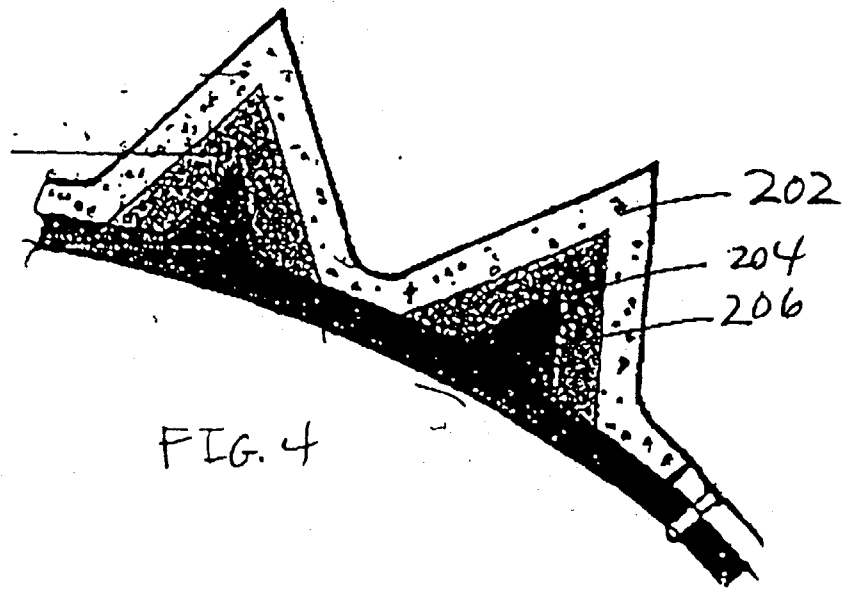


FIG. 4

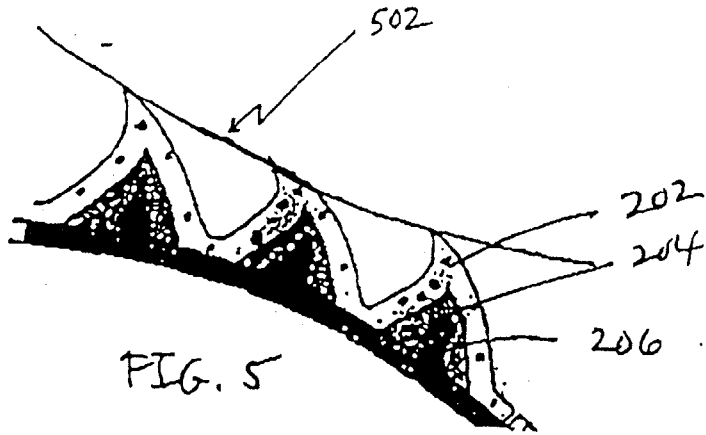


FIG. 5

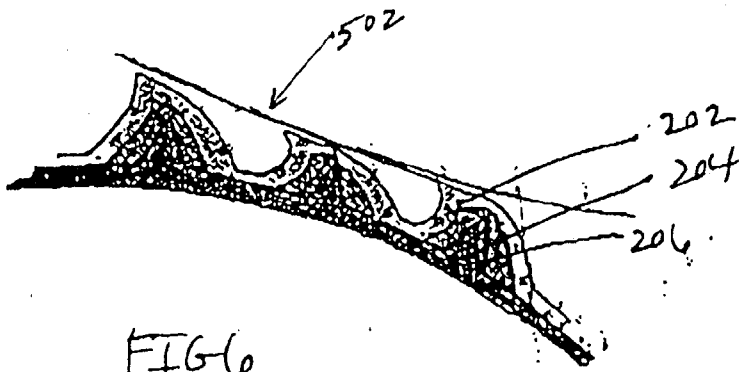


FIG. 6



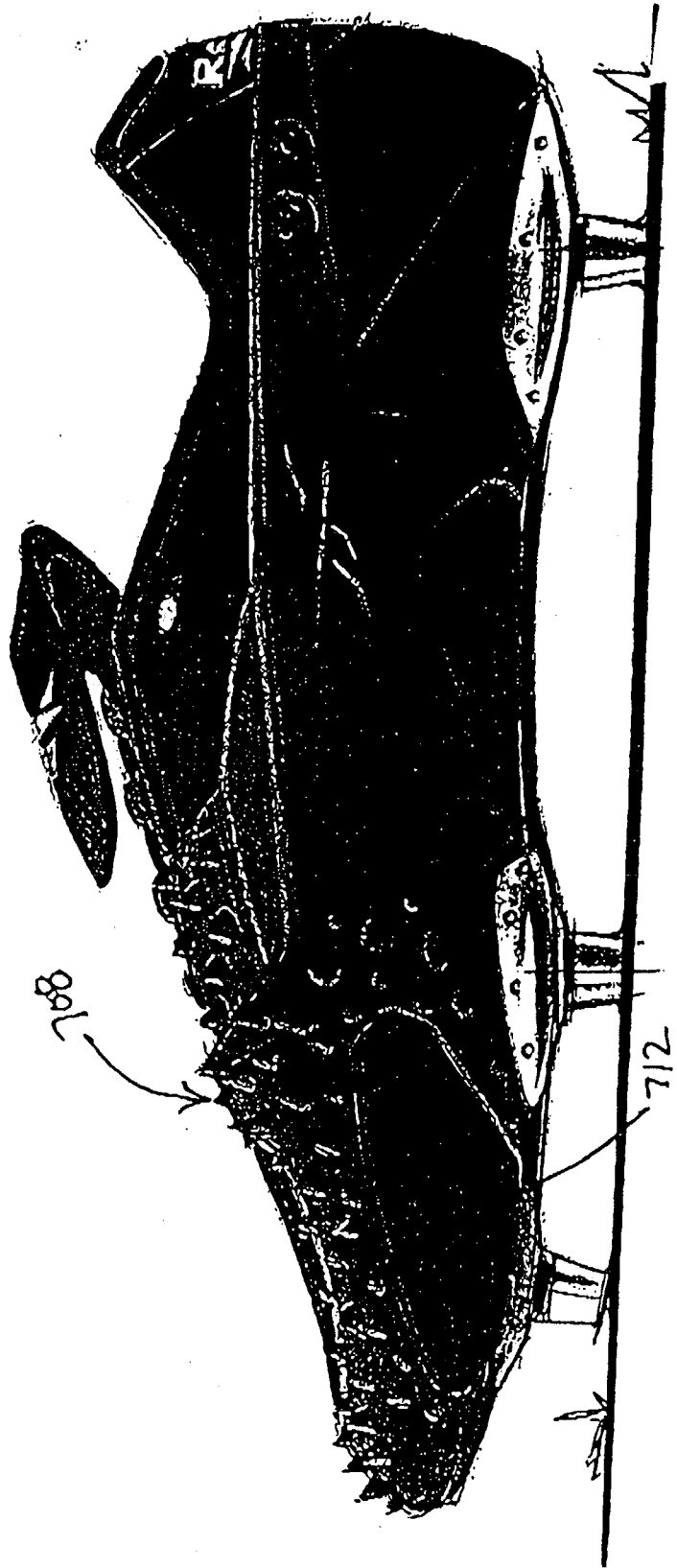
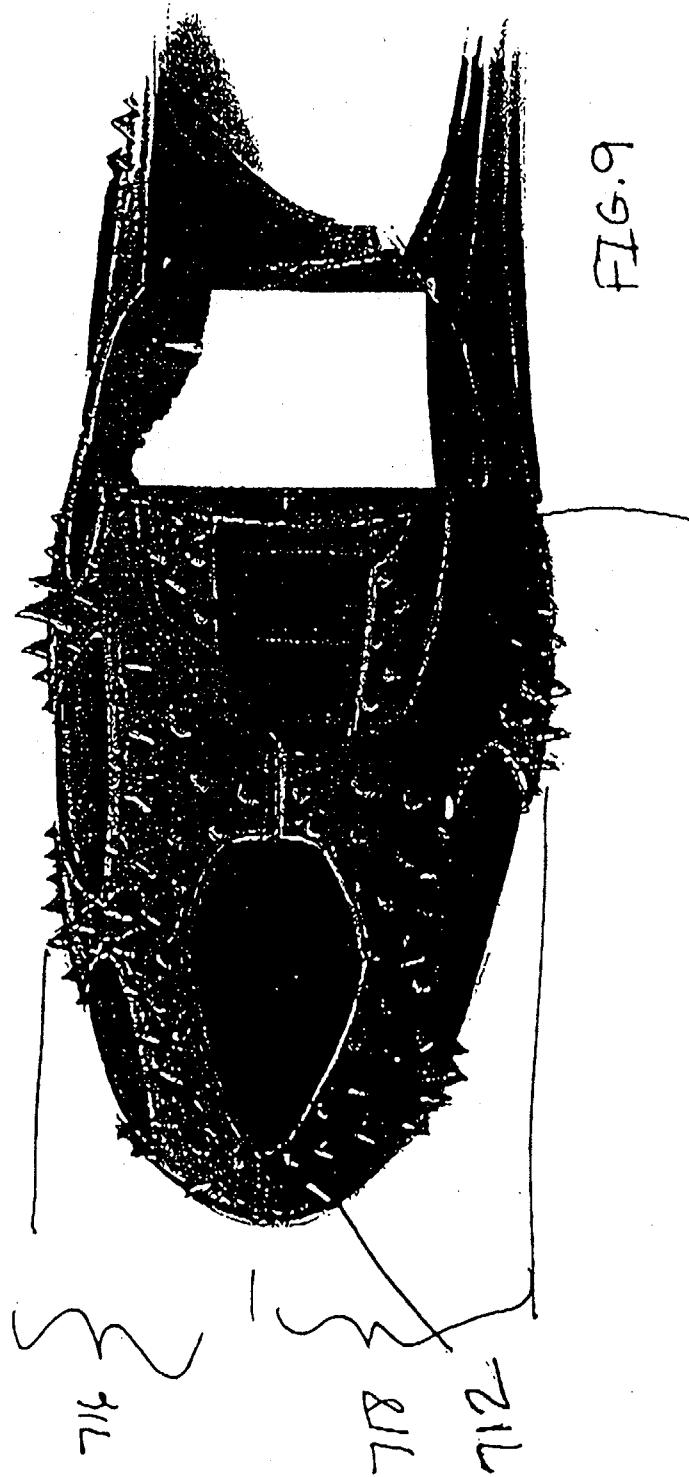


FIG. B



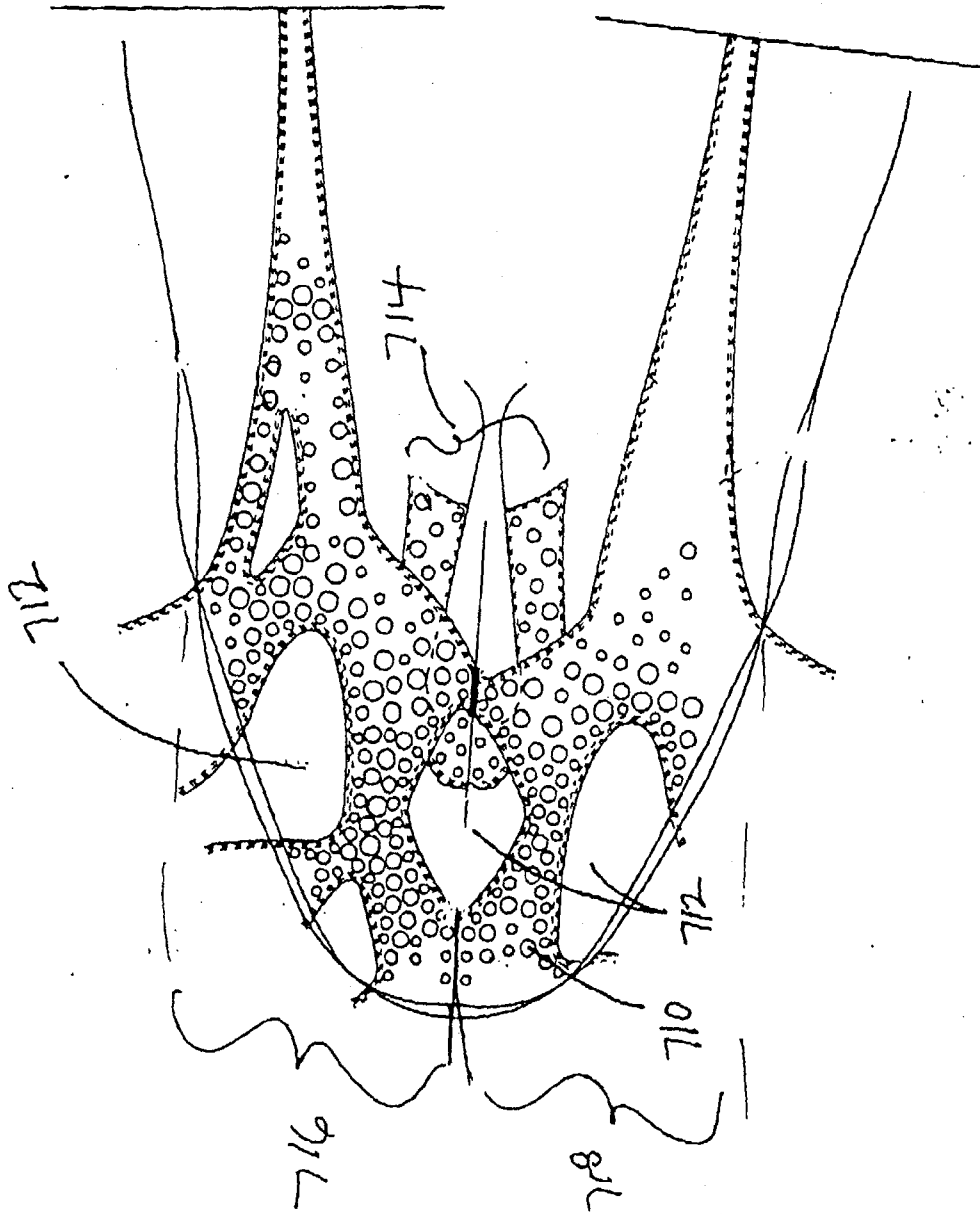


FIG. 10

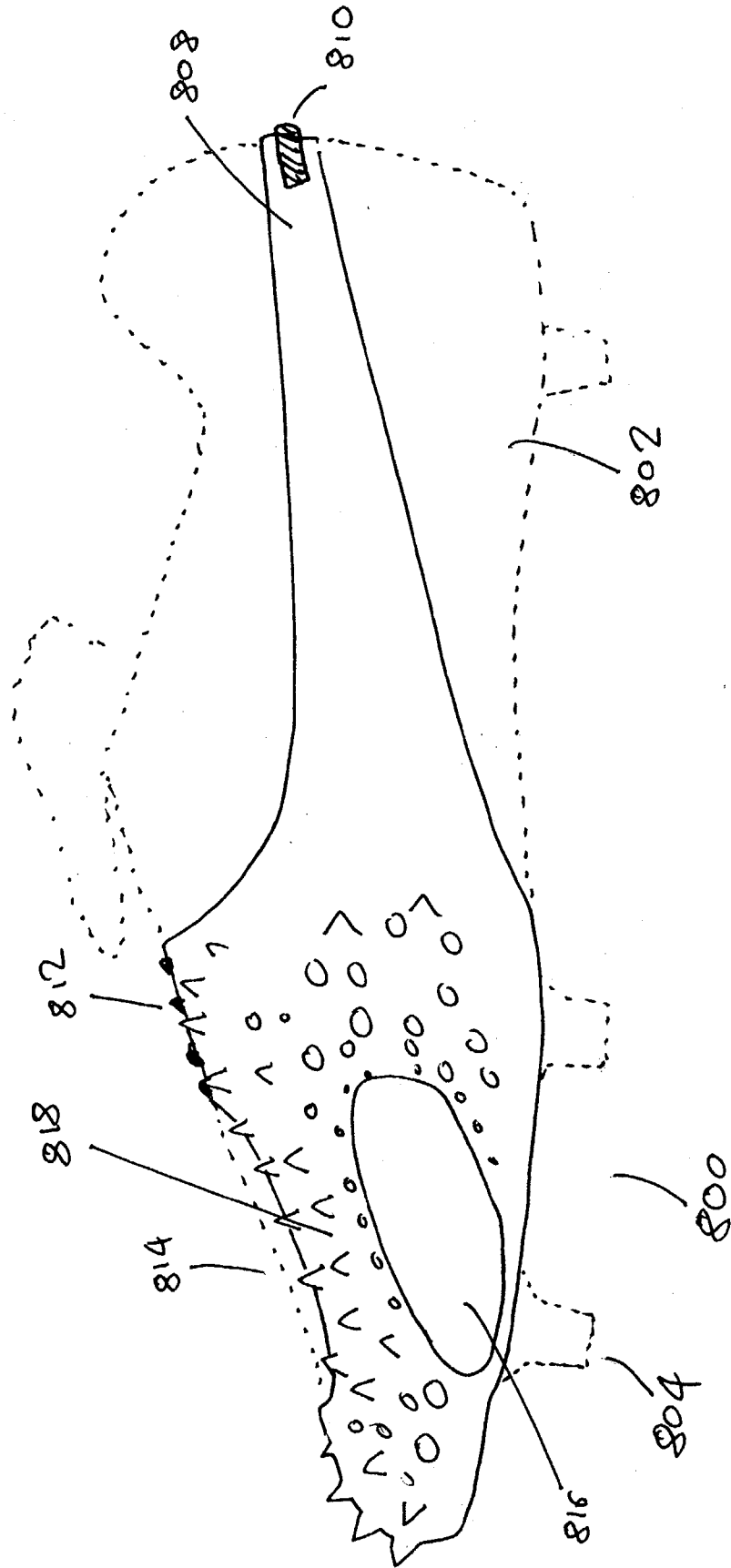


Fig. 11

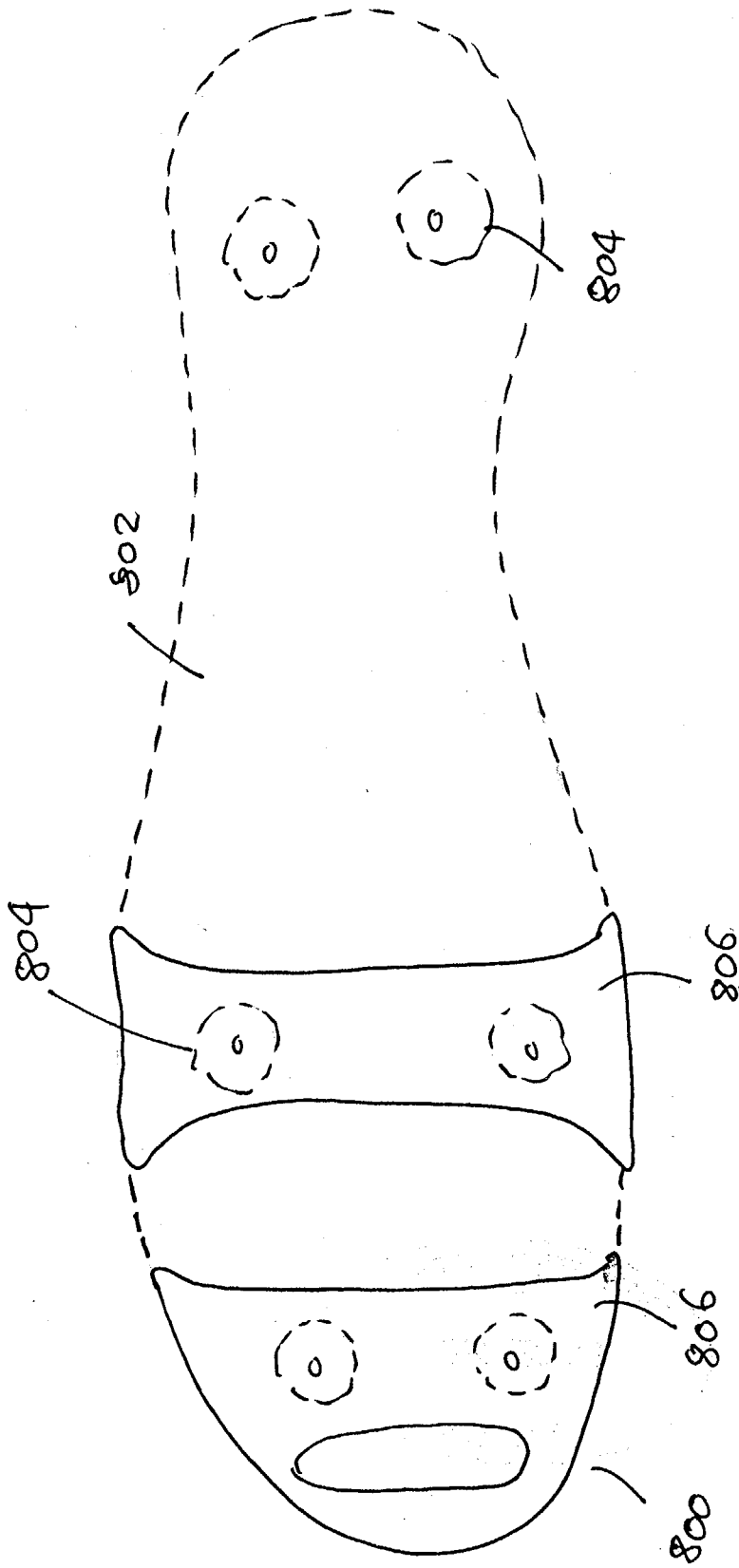


Fig. 12



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 25 7995

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	GB 2 286 517 A (LOVELOCK VAUGHAN ADRIAN) 23 August 1995 (1995-08-23) * page 8, line 21 - page 11, line 11; figures 1-3 *	1-5, 9-15, 23-32,43	A43B5/02 A43B5/18
X	DE 298 00 180 U (KROHN HANS HEINER) 16 April 1998 (1998-04-16) * the whole document *	1-5,23, 24,43	
X	WO 96/32856 A (ADIDAS AG) 24 October 1996 (1996-10-24) * the whole document *	1,5,6,9, 10,16, 23-27, 32,33,43	
X	US 5 437 112 A (JOHNSTON CRAIG) 1 August 1995 (1995-08-01) * column 4, line 63 - column 6, line 25; figures 7a,7b,7c *	25-32, 35-38, 42,43	
X	GB 2 361 406 A (DAVIS IAIN) 24 October 2001 (2001-10-24) * the whole document *	25-33,43	TECHNICAL FIELDS SEARCHED (Int.Cl.7) A43B
X	WO 02/054898 A (KANG SAEYOUNG ; LEE DAEHEE (KR)) 18 July 2002 (2002-07-18) * page 4, line 7 - page 9, line 26; figures 1-6 *	25-33,43	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 16 March 2004	Examiner 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	

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 03 25 7995

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

16-03-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2286517	A	23-08-1995	GB 2318500 A ,B	29-04-1998
DE 29800180	U	16-04-1998	DE 29800180 U1	16-04-1998
WO 9632856	A	24-10-1996	AU 5843496 A	07-11-1996
			BR 9606326 A	16-09-1997
			CA 2193229 A1	24-10-1996
			EP 0766521 A2	09-04-1997
			WO 9632856 A2	24-10-1996
			JP 10501725 T	17-02-1998
US 5437112	A	01-08-1995	AU 650081 B2	09-06-1994
			AU 9018691 A	12-01-1993
			DE 69117186 D1	28-03-1996
			DE 69117186 T2	05-09-1996
			EP 0544841 A1	09-06-1993
			ES 2086009 T3	16-06-1996
			WO 9222224 A1	23-12-1992
GB 2361406	A	24-10-2001	AU 4856601 A	30-10-2001
			EP 1276398 A1	22-01-2003
			WO 0178540 A1	25-10-2001
			US 2003167658 A1	11-09-2003
WO 02054898	A	18-07-2002	KR 2001025630 A	06-04-2001
			BR 0109168 A	10-12-2002
			CN 1416325 T	07-05-2003
			EP 1359819 A1	12-11-2003
			WO 02054898 A1	18-07-2002
			KR 2002061101 A	22-07-2002