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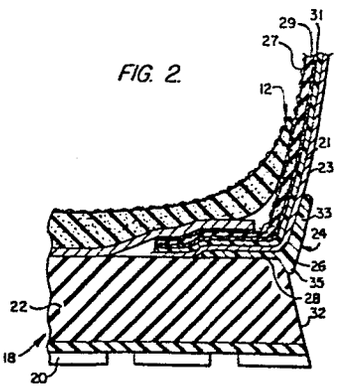
(54) Athletic shoe with heel counter reinforcement.

(57) An athletic shoe in accordance with the present invention includes a shoe upper (12) having an outer surface and an inner surface. A counter is attached to the upper (12) in the area around the heel for providing form to the upper in the area around the heel and for providing a degree of stability to the heel of the wearer of the shoe during running. A sole is secured to the upper. The sole includes an outer sole layer for contacting the ground during running and a resilient cushioning midsole layer (22) secured between the upper (12) and the outer sole layer. A generally U-shaped heel counter reinforcement member of resilient material is attached to the shoe and extends from the lateral side of the shoe around the back of the heel to the medial side. The reinforcement member has a generally vertically extending wall (26) and a generally horizontally extending mounting flange (28). The mounting flange (28) is attached to the midsole layer (22). The vertical wall (26) has an upper portion (33) overlapping a portion of the side of the upper (12) for providing lateral support for the upper (12), and a lower portion (35) overlapping a portion of the side of the midsole layer (22) for cooperating with the midsole layer (22) to resist lateral rolling motion of the heel during foot strike.

FIG. 2.



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ATHLETIC SHOE WITH HEEL COUNTER REINFORCEMENT

TECHNICAL FIELD

The present invention relates to athletic shoes, and in particular, to a heel counter reinforcement used with athletic shoes.

BACKGROUND OF THE INVENTION

The modern athletic shoe is a highly refined combination of many elements which have specific functions, all of which must work together for the support and protection of the foot during an athletic event. The shoe is divided into two general parts, an upper and a sole. The upper is designed to snugly and comfortably enclose the foot. Typically, it will have several layers including a weather- and wear-resistant outer layer of leather or synthetic material such as nylon, and a soft, padded inner liner for foot comfort. Current uppers typically have an intermediate layer of a synthetic foamed material. The three layers of the upper may be fastened together by stitching, gluing, or a combination of these. In areas of maximum wear or stress, reinforcements of leather and/or plastic are attached to the upper. Examples of such reinforcements are leather toe sections attached over synthetic inner layers in the toe area and heel counters made of an inner layer of plastic and an outer layer of leather.

The other major portion of the athletic shoe is the sole. Designed to withstand many miles of running, it must have an extremely durable bottom surface to contact the ground. However, since such contact may be made with considerable force, protection of the foot and leg demands that the sole also perform a shock-absorbing function. It therefore typically includes a resilient, energy-absorbing material as a midsole in addition to the durable lower surface, i.e., the outsole. This

is particularly true for training or jogging shoes designed to be used over long distances and over a long period of time.

The normal motion of the foot of a typical runner during running proceeds as follows. First, the heel strikes the ground, then the ball of the foot. As the heel leaves the ground, the foot rolls forward so that the toes next make contact, and finally the entire foot leaves the ground to begin another cycle. During the time that the foot is in contact with the ground, it typically is rolling from the outside, or lateral side, to the inside, or medial side, a process called pronation. That is, normally, the outside of the heel strikes first, and the toes on the inside of the foot leave the ground last. While the foot is airborne and preparing for another cycle, the opposite process, called supination, occurs. Pronation, the inward roll of the foot in contact with the ground, although normal, can be a potential source of foot and leg injury, particularly if it is excessive. The counter, i.e., the relatively stiff plastic material which gives form to the upper in the area of the heel, can provide a degree of heel stability and control pronation. However, such plastic counters tend to weaken after a period of use with the result that the heel stability and pronation control function of the counter deteriorates.

The prior art has attempted to solve the pronation problem in a number of ways. One example of a prior art device directed to the problem of pronation is Norton U.S. Patent No. 4,288,929. The Norton '929 patent describes a "motion control device" which is placed between the upper and the sole at the rear of an athletic shoe. This control device includes a flat base extending under the heel of the upper and a wall rising from the edge of the flat base and surrounding a portion of the heel. In one embodiment the base extends completely between the lateral and medial walls, while in another embodiment a slot and cutout extend longitudinally through the base. This motion control device, composed of a yieldable but relatively sturdy material, is intended to introduce a degree of resistance or rigidity to oppose the normal pronation of the foot. The device is thus relatively heavy and rigid.

Furthermore, there is a degree of coupling between motion on the medial and lateral sides of the heel, particularly in the embodiment

where the base extends completely between the lateral and medial sides. Also, the natural expansion and compression of the sides of the shoe during running are restrained to a degree by such a relatively heavy and rigid motion control device.

In another prior art shoe, heel stability is enhanced by placing a wedge shaped bead of resilient material about the perimeter of the heel between the upper surface of a resilient midsole layer and the upper. The bead provides additional support for the heel counter along its area of maximum stress to alleviate the problem of premature fatigue of the counter.

SUMMARY OF THE INVENTION

An athletic shoe in accordance with the present invention includes a shoe upper having an outer surface and an inner surface. A counter is attached to the upper in the area around the heel for providing form to the upper in the area around the heel and for providing a degree of stability to the heel of the wearer of the shoe during running. A sole is secured to the upper. The sole includes an outer sole layer for contacting the ground during running and a resilient cushioning midsole layer secured between the upper and the outer sole layer. A generally U-shaped heel counter reinforcement member of resilient material is attached to the shoe and extends from the lateral side of the shoe around the back of the heel to the medial side. The reinforcement member has generally vertically extending wall and a horizontally extending mounting flange. The mounting flange is attached to the midsole layer. The vertical wall has an upper portion overlapping a portion of the side of the upper for providing lateral support for the upper, and a lower portion overlapping a portion of the side of the midsole layer for cooperating with the midsole layer to resist lateral rolling motion of the heel during foot strike.

A shoe in accordance with the present invention also includes a heel counter located about the heel area of the upper. The heel counter is formed of a relatively stiff material and is designed to give permanent form to the upper about the heel and to provide a degree of heel control or stability and, thus, to reduce the tendency of pronation.

In the preferred embodiment of the present invention, the medial

side of the U-shaped heel counter reinforcement is longer than the lateral side and has a higher wall. This increases control over the rolling of the heel on the side where control is most needed.

The heel counter reinforcement is made of a relatively stiff yet flexible material to exert a degree of control over rolling of the heel, yet also to allow some freedom of motion. The flange, fastened between the shoe upper and the sole, anchors the heel counter reinforcement member to the shoe. As the upper rolls to one side, it presses against the wall of the heel counter reinforcement member; and this force is transmitted to the lower portion of the wall, which overlaps on the midsole. The lower portion of the wall presses into the midsole layer to provide a resistance force to further rolling motion.

The present invention seeks to enhance control of pronation during running. This is accomplished by the use of the reinforcement member which is light in weight, inexpensive, and yet constructed so that motion other than pronation is not unnecessarily restricted by it. Due to its shape and placement, the reinforcement member cooperates with the heel counter and a cushioning midsole in such a manner that the stress on the counter is relieved and the durability of the counter is prolonged, so that the tendency of the counter to hinder pronation is both prolonged and enhanced. Because, during pronation, the foot rolls from the lateral to the medial side, the reinforcement member extends further forward on the medial side to present increased resistance to the roll of the foot on the medial side of the shoe. Because of its relatively small size and its cooperation with the midsole layer, the reinforcement member enhances control of pronation and at the same time accommodates the compressive and expansive flexing of the sides of the shoe upper.

The upper has the specific function of providing a lightweight, comfortable, protective enclosure for the foot during running. To this end, it may be constructed with several layers, for example, an inner layer of soft, ventilating, knitted nylon, an intermediate cushioning layer of foam rubber, and an outer protective layer of closely woven nylon. At points of greater wear or where increased protection or stiffness are required, such as the front of the toe and the lateral side of the upper,

a layer of leather may be fastened to the outside of the upper by gluing or sewing.

The functions of the sole are to resist wear during ground contact and to withstand the forces developed when the foot strikes the ground, cushioning the foot and protecting the runner from injury and fatigue. The sole also provides a broad, stable base to support the foot during ground contact. It generally has a relatively hard lower outsole layer with a contoured bottom surface to increase traction, and a relatively flexible and energy-absorbing midsole layer, to which the shoe upper is attached, to cushion the foot and absorb the shock produced when it strikes the ground. For increased stability, the bottom surface of the sole is made somewhat wider than the foot; and, the midsole layer of the sole is then tapered inward toward the top so that its width at the point where it is fastened to the shoe upper is approximately the same as the width of the shoe upper at that point. A wedge-shaped sole is therefore formed, with its base wider than its top and sides which slant inward from bottom to top.

Various advantages and features of novelty which characterize the invention are pointed out with particularity in the claims annexed hereto and forming a part hereof. However, for a better understanding of the invention, its advantages, and objects attained by its use, reference should be had to the drawings which form a further part hereof and to the accompanying descriptive matter in which there is illustrated and described the preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view showing an athletic shoe in accordance with the present invention with the heel counter reinforcement in place.

Figure 2 is a sectional view, on an enlarged scale, of the athletic shoe of Figure 1, taken generally along lines 2-2 of that figure.

Figure 3 is a top plan view of the heel counter reinforcement of the present invention showing the position occupies in relation to an athletic shoe.

Figure 4 is a sectional view, taken generally along line 4-4 of Figure 3.

Figure 5 is a sectional view, taken generally along line 5-5 of Figure 3.

DETAILED DESCRIPTION OF THE INVENTION

Referring to the drawings in detail, wherein like numerals indicate like elements, there is shown in Figure 1 an athletic shoe in accordance with the present invention and designated generally as 10. A shoe upper 12 extends completely around the foot and includes provisions for lacing 14. Upper 12 may have one or more reinforced portions 16, 17 and 19 at areas of high stress in which leather or some other durable material is sewn to the outside of the upper 12. Reinforced portion 19 is in the form of a conventional heel counter including an inner layer 21 of a relatively stiff material, such as hard plastic and an outer cover layer 23 of leather. Upper 12 preferably includes an inner liner 27, an intermediate layer 29 of a foam cushioning material and an outer layer 31 of a tightly woven synthetic material. Three layer uppers are illustrated in U.S. Patents Nos. 3,793,750 and 4,255,876.

Attached to the bottom of upper 12 by a conventional method is a sole 18, comprised generally of at least two layers including an outsole layer 20 and a midsole layer 22. The outsole layer 20 is contoured on its bottom surface to increase traction. It is composed of a relatively hard resilient material so that it will wear well through repeated ground contact. The midsole layer 22 need not be as hard, but should be resilient and cushioning to absorb the shocks of running so the foot and leg are protected. Thus, midsole layer 22 is preferably formed of a cushioning resilient material, such as EVA, foamed polyurethane or an encapsulated air cushion, with a hardness preferably in the range of 20 to 55 durometer on the Shore A scale.

Referring now to Figure 2, the relation of a heel counter reinforcement 24 to the shoe upper 12 and the sole 18 is more clearly shown. At the rear of the shoe, the heel counter reinforcement 24 is fastened between the upper 12 and the midsole layer 22. Heel counter reinforcement 24 has a generally U-shaped configuration in plan view with a generally horizontal support or mounting flange 28 and a generally vertical wall 26. Vertical wall 26 is formed integral with flange 28, and has an upper portion 33 extending generally vertically upward from

the outer edge of flange 28 and a lower portion 35 extending generally vertically downward from the outer edge of flange 28. The horizontal flange 28 extends between a lower surface of upper 12 and an upper surface of midsole 22. Flange 28 is fastened in place preferably by glue to midsole 22 with upper 12 being glued above flange 28. The inwardly facing surface of the upper portion 33 of vertical wall 26 is also preferably attached to the outer surface of upper 12 by glue. In this manner, heel counter reinforcement 24 is attached to shoe 10. Vertical wall 26 extends substantially vertically, i.e. not precisely vertically, so that it follows the upward extent of the heel area of the upper. The bottom of midsole layer 22 is somewhat wider than its top; consequently, it is necessary for the sides 32 of the sole to slant inward from the bottom to top. The inner surface of lower surface of lower portion 35 of vertical wall 26 is sloped to approximately match the slant of midsole layer 22. Heel counter reinforcement 24 cooperates with counter 19 and midsole 22 to control pronation.

As was mentioned in the background of the invention, heel counter 19 provides a degree of heel control, which in turn controls pronation. However, over a period of time a typical heel counter weakens so that the degree of heel control lessens. Dependent upon the material used to make the counter, weakening can occur after as little as 100 miles of running. The heel counter reinforcement 24 of the present invention lengthens the time over which the heel counter effectively provides heel control to thereby enhance the overall heel stability function of the shoe. Heel counter reinforcement 24 accomplishes this in a lightweight or efficient manner because of its particular location, size, shape and hardness, and the manner in which it interacts with the heel counter 19 and midsole layer 22.

Upper portion 33 of wall 26 extends around heel counter 19 along its area of maximum stress during running. This upper portion 33 thus provides reinforcement in the area of maximum stress. Stress on counter 19 is additionally relieved by the interaction of lower portion 35 of wall 26 with midsole layer 22.

During running, the foot exerts forces on the shoe illustrated by Fm and Fl in Figure 5, where m denotes the medial side of the shoe

and l the lateral side. As one of these forces, Fm for example, is exerted on the shoe it is transmitted to the upper portion 33 of wall 26 of heel counter reinforcement 24, which because of its mass provides some resistance to the force Fm. Force Fm is also transmitted to lower portion 35 of vertical wall 26. The force transmitted to lower portion 35 of wall 26 is resisted by the side 32 of midsole layer 22 on which it rests. A lower portion 35 of 1/8 of an inch height has been found sufficient for this purpose. Sideward and downward force Fm is therefore controlled by a number of elements and their interaction with one another, i.e., the relatively stiff counter 19, the upper portion 33 of wall 26 and the interaction of lower portion 35 of heel counter reinforcement 24 with midsole layer 24. The heel counter reinforcement 24 operates in a similar manner on the lateral side of the shoe when the foot exerts a force illustrated by Fl in Figure 5. This interaction resists forces Fm, Fl, so that the amount of flexure of the counter is reduced to thereby reduce the stress on or tendency to breakdown of counter 19.

Referring now to Figures 3-5, various features of the preferred embodiment of the invention are illustrated. Because the foot rolls from the lateral to the medial side during ground contact in running, more control is appropriate on the medial side. In the preferred embodiment of the present invention, heel counter reinforcement 24 extends farther forward along the medial side of the shoe than along the lateral side. Medial wall 26_m, including upper and lower portions 33, 35 and medial flange 28_m are longer than the corresponding lateral parts; 26_l and 28_l. For example, the distance "C" of approximately 3-1/8 inches between the rearmost inner surface of reinforcement 24 and the front edge of wall 26_m, and a distance "D" of approximately 2-7/16 inches between the rearmost inner surface of reinforcement 24 and the front edge of side wall 28_l has been found suitable for average size men's shoes. The additional length of heel counter reinforcement 24 on the medial side provides increased resistance to the roll motion of the foot on that side. In Figure 3, the arch, i.e., generally the portion of the shoe which curves inward at the boundary between sole and upper, of the shoe is indicated by numeral 36. The beginning of the

inward curve, the beginning 38 of the arch 36, is shown as a preferred approximate forward limit of the medial portion of heel counter reinforcement 24.

An additional feature of the preferred embodiment of the present invention is shown in Figure 4. Most of the wall 26 of heel counter reinforcement 24 has a height H above the top of the flange 28. In order to provide additional control of the rolling motion of the foot on the medial side, the wall 26_m on that side is made slightly higher, a height shown as H' in Figure 4. Figure 5 also illustrates the difference between the height of medial wall 26_m and lateral wall 26_l. A height differential of approximately 1/16 of an inch between heights H and H', wherein the height H is approximately 3/8 of an inch, has been found acceptable.

Another feature of the preferred embodiment of heel counter reinforcement 24 is its combination of flexibility with control. By making the flange 28 relatively narrow, for example, slightly greater than 1/2 of an inch, by introducing into it radial notches 34, and by keeping it relatively thin, for example 0.02 to 0.04 inch, heel counter reinforcement 24 can be made flexible enough so that it does not unduly restrain the foot. Notches 34 are placed in the curved rear portion of flange 28 and are oriented approximately toward the center point P of the curved portion of the heel counter reinforcement, hence the term "radial" notches. Of the total width A of the widest point of the heel of the shoe upper 12, the width B of flange 28 should be only a small portion in order to preserve the flexibility of the heel counter reinforcement 24. It has been found that if the width B of flange 28 is no greater than 1/4 of the width A of the widest point of the heel of the shoe upper, the necessary flexibility will exist. The two sides of the heel counter reinforcement 24 act independently of each other when differential vertical forces are applied to them. Thus, there is virtually no coupling between vertical motions on the lateral and medial sides of the heel caused by reinforcement 24.

Frequently during running forces Fm and Fl (see Figure 5) will be exerted simultaneously because of the expansion of the foot in both the medial and lateral directions during foot strike. It is desirable that

this natural expansion of the foot not be unnecessarily restricted, and the heel counter reinforcement of the present invention is able to allow this to occur. That is, the previously-described features of the heel counter reinforcement which make it more flexible also accommodate the compressive and expansive flexing of the sides of the shoe upper.

By forming notches 34 in flange 28 and by keeping the width of the flange as small as possible, the weight of the heel counter reinforcement 24 can be minimized. Another way to minimize the weight of the heel counter reinforcement is to make it from a lightweight material. The material must also be relatively stiff to perform the heel counter reinforcement's function of transmitting and resisting forces, and yet flexible enough to allow the foot to move comfortably. Materials within a hardness in the range of 60 to 90 durometer on the Shore A scale have been found to meet these criteria. Polyurethane of 80 Shore A durometer hardness has been found particularly suitable.

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, and the novel features thereof are pointed out in the appended claims. The disclosure, however, is illustrative only, and changes may be made in detail, especially in matters of shape, size, and arrangement of parts, within the principle of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed. For example, although the heel counter reinforcement has been illustrated in the context of a shoe made to fit the right foot, the present invention is equally applicable to both left and right shoes. Heel counter reinforcements for both shoes would be mirror images of each other.

CLAIMS

1. In an athletic shoe having a shoe upper, a counter attached to the shoe upper in the area of the heel, and a shoe sole attached to the bottom of the shoe upper, said shoe sole including a layer of cushioning resilient material between the ground contacting surface of the shoe sole and the upper, a heel counter reinforcement fastened between the shoe upper and the shoe sole at the rear and sides of the heel of the athletic shoe to provide sideward support for the counter, said heel counter reinforcement comprising:

a generally U-shaped member of resilient material having a substantially vertical wall and a substantially horizontal flange, both said wall and flange surrounding a portion of rear and sides of the shoe upper, said horizontal flange extending inward from an inner vertical surface of said vertical wall and being attached to said shoe, said vertical wall including an upper portion and a lower portion, said upper portion extending upward from said flange and surrounding a portion of the counter to reinforce the counter, said lower portion extending downward from said flange and overlapping a portion of the side of the shoe sole to cooperate with the sole to inhibit sideward rolling of the foot during foot strike.

2. An athletic shoe comprising:

a shoe upper having an outer surface and an inner surface;

a counter attached to said upper in the area around the heel for providing form to the upper in the area around the heel and for providing a degree of stability to the heel of a wearer of the shoe during running;

a sole secured to said upper, said sole including an outer sole layer for contacting the ground during running and resilient cushioning midsole layer secured between said upper and said outer sole layer; and

a generally U-shaped heel counter reinforcement member of a resilient material attached to said shoe and extending from the lateral side of said shoe around the back of the heel to the medial side, said reinforcement member having a generally vertically extending wall and a generally horizontally extending mounting flange, said mounting flange being attached to said midsole layer; and

said vertical wall having an upper portion overlapping a portion

of a side of said upper to provide lateral support for said counter and upper and a lower portion overlapping a portion of a side of said midsole layer for cooperating with said midsole layer to resist lateral rolling motion of the heel during foot strike.

3. An athletic shoe as claimed in claim 2 wherein said heel counter reinforcement member is formed of a resilient material within the hardness range of approximately 60 to 90 durometer on a Shore A scale.

4. An athletic shoe as claimed in claim 2 or 3 wherein said vertical wall extends forward to approximately the arch area on the medial side of the shoe.

5. An athletic shoe as claimed in claim 2 wherein said upper portion of said vertical wall has a maximum height on the medial side of the shoe.

6. An athletic shoe in accordance with claim 5 wherein said maximum height of said vertical wall above said mounting flange is approximately 7/16 of an inch and the average height of said vertical wall along the rear and lateral sides of said reinforcement member is approximately 3/8 of an inch.

7. An athletic shoe in accordance with claim 2 wherein said lower portion of said vertical wall has a height of approximately 1/8 of an inch.

8. An athletic shoe as claimed in claim 2 wherein said outer sole layer is contoured to increase traction.

9. An athletic shoe as claimed in claim 2 wherein the width of said flange is no greater than one-quarter of the maximum width of the heel of the shoe upper.

10. An athletic shoe as claimed in claim 9 wherein said flange contains a plurality of radial notches to increase the flexibility of said flange.

11. A athletic shoe comprising:

a shoe upper having an outer surface and an inner surface;

a counter attached to said upper in the area around the rear and lateral and medial sides of the heel for providing form to the upper in the area around the heel and for providing a degree of stability to the

heel of a wearer of the shoe during running;

a sole secured to said upper, said sole including an outer sole layer of a resilient wear resistant material for contacting the ground during running and a resilient cushioning midsole layer secured between said upper and said outer sole layer; and

a generally U-shaped heel counter reinforcement member of a resilient material within the hardness range of approximately 60 to 90 durometer on a Shore A scale, said reinforcement member being attached to said shoe and extending from the lateral side of said shoe adjacent the arch area around the back of the heel to the medial side, said reinforcement member having a generally vertically extending wall and a generally horizontally extending mounting flange, said mounting flange being attached to said midsole layer; and

said vertical wall having an upper portion overlapping a portion of a side of said upper to provide lateral support for said counter and upper and a lower portion overlapping a portion of a side of said midsole layer for cooperating with said midsole layer to resist lateral rolling motion of the heel during foot strike, said upper portion having a maximum height on the medial side of the shoe.

12. An athletic shoe comprising:

a shoe upper having an outer surface and an inner surface;

a counter attached to said upper in the area around the rear and lateral and medial sides of the heel for providing form to the upper in the area around the heel and for providing a degree of stability to the heel of a wearer of the shoe during running;

a sole secured to said upper, said sole including an outer sole layer of a resilient wear resistant material for contacting the ground during running and a resilient cushioning midsole layer secured between said upper and said outer sole layer; and

a generally U-shaped heel counter reinforcement member of a resilient material within the hardness range of approximately 60 to 90 durometer on a Shore A scale, said reinforcement member being attached to said shoe and extending from the lateral side of said shoe adjacent the arch area around the back of the heel to the medial side, said reinforcement member having a generally vertically extending wall and

a generally horizontally extending mounting flange, said flange having a width less than one-quarter of the maximum width of the heel of the shoe upper, said mounting flange being attached to said midsole layer; and

said vertical wall having an upper portion overlapping a portion of a side of said upper to provide lateral support for said counter and upper and a lower portion overlapping a portion of a side of said midsole layer for cooperating with said midsole layer to resist lateral rolling motion of the heel during foot strike, said upper portion having a maximum height of approximately 7/8 of an inch on the medial side of the shoe, and said lower portion having a height of approximately 1/8 of an inch.

FIG. 1.

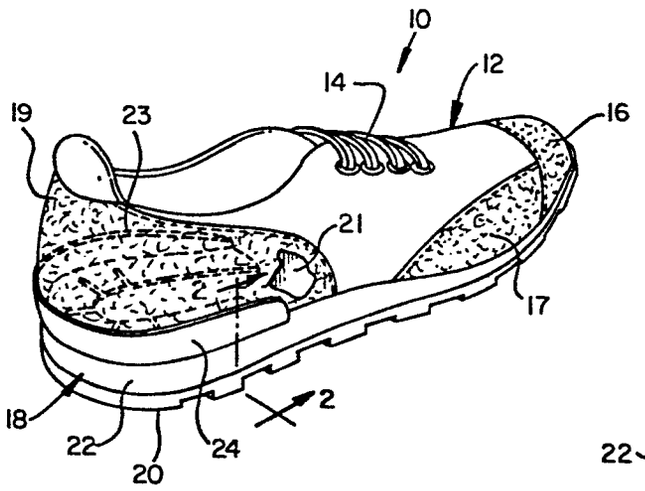


FIG. 2.

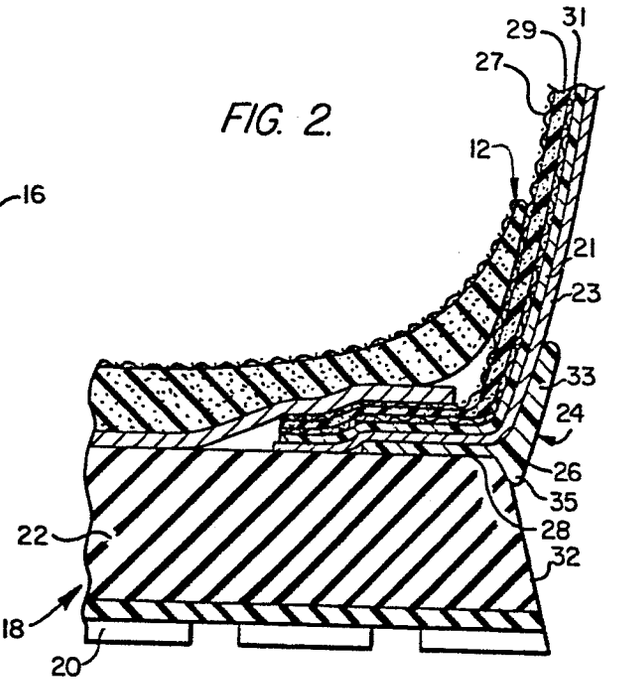


FIG. 3.

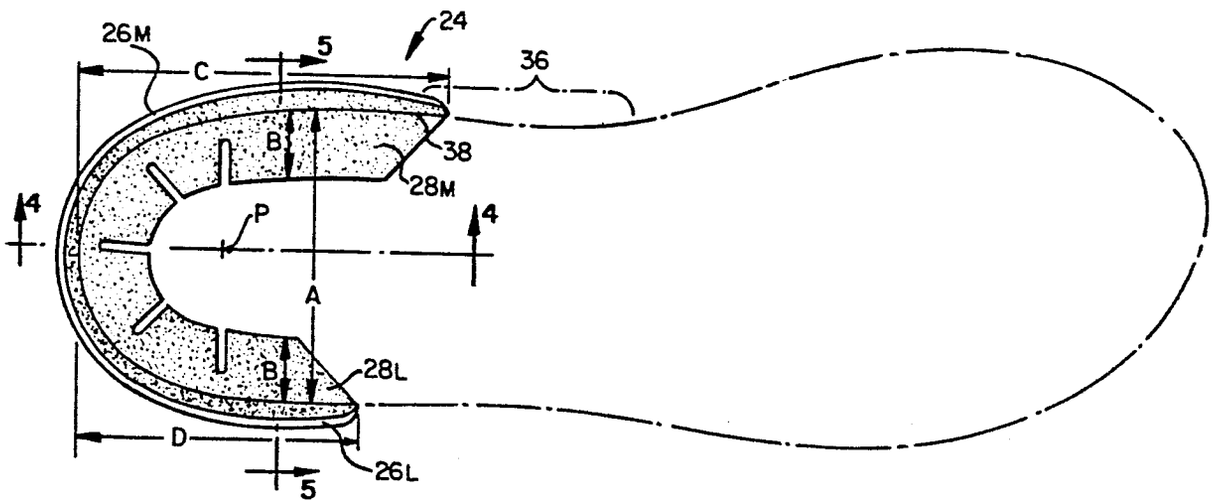


FIG. 4.

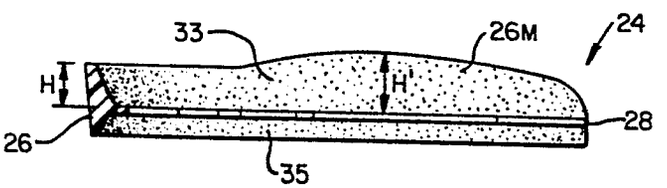
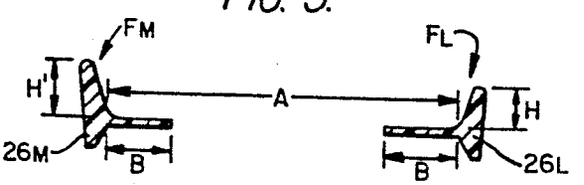


FIG. 5.



European Patent Office

EUROPEAN SEARCH REPORT

Application number 0098542

DOCUMENTS CONSIDERED TO BE RELEVANT

EP 83303187.5

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
X,D	US - A - 4 288 929 (E.J. NORTON) (15-09-1981) * Fig. 1,2,7; claim 7 *	1,2,3	A 43 B 5/06
X	US - A - 4 107 857 (G.P. DEVLIN) * Fig. 2, pos. 17,22 *	1,2,9	
X,Y	GB - A - 2 033 729 (BRS INC.) * Fig. 1,6; page 2, lines 88-94 *	1,2,3, 4,9,10	
Y	US - A - 4 129 951 (H. PETROSKY) * Fig. 4 *	1	
Y	FR - A - 1 104 296 (KAVAMAR COMP.) * Fig. 1-5 *	10	TECHNICAL FIELDS SEARCHED (Int. Cl. ³) A 43 B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
VIENNA	04-08-1983	SAMSEGGER

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
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E : earlier patent document, but published on, or after the filing date
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