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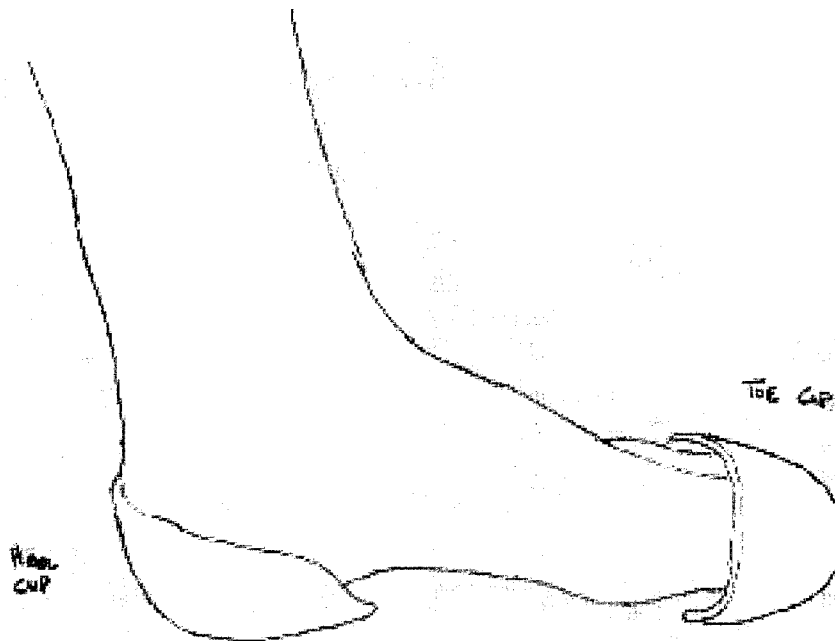


FIGURE 1

(57) Abstract: A series of ballistic plates arrayed inside the construction of the boot which allows an increased level of protection to the foot, specifically the front and top of the toe, the rear and side of the heel and the bottom of the foot. The ballistic material shall be comprised of a rigid or semi rigid ballistic material to include aramid fibers, high molecular weight polyethylene, a combination of these, or other high performance fiber types.

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BOOT GUARDS

FIELD OF INVENTION

[0001] The present technology relates to anti-ballistic systems, and more particularly to a versatile foot guard that is of a relatively lightweight construction and which provides ballistic protection with a full range of motion and joint articulation for the foot of an individual, a soldier, or a policeman.

BACKGROUND OF THE INVENTION

[0002] The modern battlefield is more dangerous and violent than ever before. "Smart" weapons, automatic weapons, and improved munitions have dramatically increased the probability of multiple injuries to combatants. Multiple injuries decrease the proportion of surviving wounded. Combat wounds are unique in that there is a high percentage of penetrating wounds, multi-system multi-etiological injuries with a high degree of wound contamination. The nature of asymmetric warfare has moved a portion of the battlefield into an urban or indigenous setting. The opponent's unconventional weapon of choice (I.E.D. or Improvised Explosive Device) causes projectile wounds to lower limbs. Lower limb injury caused by explosive discharge, shrapnel, and bullets is the most common battlefield injury. For example, far more than thirty-five (35) percent of United States personnel war wounds in the last ninety (90) years have been projectile injuries to the lower extremities. Modern armor, aggressive application of tourniquets on the injured extremities, and rapid medical care help most of the injured survive.

[0003] Ballistic protection systems are widely used throughout the world in military, police, personnel protection, and security applications. The range and types of anti-ballistic protection systems are vast. For example, there is a wide range of heavy duty anti-ballistic protection devices that are commonly employed on and around military vehicles. Much attention has been given to the individual soldier or policeman. In that regard, much research and development has been devoted to providing improved body armor, for example, in the form of improved anti-ballistic vests, bulletproof torso protection, etc. However, no feasible option for foot protection has been provided or fielded, which clearly demonstrates an unfulfilled need.

[0004] Therefore, there has been and continues to be a need for a versatile anti-ballistic protection device for an individual soldier, or policeman that provides foot ballistic protection with full range of motion and joint articulation without sacrificing mobility or the ability of the wearer to maneuver.

SUMMARY OF THE INVENTION

[0005] The present technology relates to the rigid protective materials form fitted materials built into the heel and toe cup of the boot, as well as the arch portion of the boot. The ballistic toe protection fits into an enlarged toe cap which is sewn into the boot. This enlarged toe cap is made of traditional, and is sized appropriately to allow insertion of the ballistic shaped toe protection into it while accounting the thickness of the ballistic material. The shaped ballistic piece is held by adhesive to ensure it stays in place. The shape and placement of the heel, toe and arch pieces provides the body surface area for protection to the foot below the ankle without hampering the normal movement of the foot for function without adding unacceptable weight. Objects and advantages of the present technology will become apparent from a study of the following description and the accompanying drawings which are merely illustrative of such technology.

DESCRIPTION OF THE INVENTION

[0006] The present technology is configured to primarily provide ballistic protection for the wearer's foot. The major platform for the device is the standard issue boot. The technology includes three components added into the manufacturing of the boot: a molded toe cup, a molded heel cup, and a molded arch support. The standard toe cup is made from leather, cardboard or synthetic material and sewn to the sole of the boot. The purpose of this piece is to hold the shape of the toe portion of the up so it will not contact the toe. The heel piece has similar placement and function. The arch piece is secured directly to the sole of the boot, for which the thickness of the sole of the boot is shaped to receive the arch piece.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIGURE 1 is a side view of one foot which shows the placement of the toe and heel in relation to the foot.

[0008] FIGURE 2 is the bottom, side and front to back view of the heel piece.

[0009] FIGURE 3 is the top, side and oblique view of the toe piece.

[0010] FIGURE 4 of the overhead view of the arch piece.

[0011] FIGURE 5 is the side view of the arch piece.

DETAILED DESCRIPTION

[0012] As required, detailed features and embodiments of the invention are disclosed herein. However, it is to be understood that the disclosed features and embodiments are merely exemplary of the technology that may be embodied in various and alternative forms. The figures are not necessarily to scale, and some features may be exaggerated or minimized to show details of particular components. Therefore, specific structural and functional details disclosed herein, and any particular combination of these details, are not to be interpreted as limiting, but merely as a basis for claims and as a representative basis for teaching one skilled in the art to variously employ the technology.

[0013] With further reference to the drawing, the foot guard is shown herein. Generally the foot guard includes three pieces per foot which are composed of an acceptable composite material.

[0014] FIGURE 1 is a side view of one foot which shows the placement of the toe and heel in relation to the foot. The three pieces are shown relative to their placement on the foot.

[0015] FIGURE 2 is the bottom, side and front to back view of the heel piece. The heel piece is a molded/formed ballistic shield of the same relative size and shape as the existing heel cup in the standard issue ARMY boot. The ballistic piece is fitted into the boot by means of gluing the shaped ballistics into the formed shaping cardboard, in a manner similar to steel toed boots. The covered portion shall be centered over the top of the toes, and end just distal to the junction of the foot. The bottom is relatively flat open having a lip around the rim which will seat against the flat portion of the sole. The sole of the boot slides into the lip of the flat bottom where it sets.

[0016] FIGURE 3 is a top, side and oblique view of the toe piece. The toe piece is a shaped piece of composite type or other protective type material shaped to make a cup which covers the end and top of the toes. It is cut out along the bottom with the exception of a lip to allow the piece to align and attach to the shaped toe cup of the boot. The top of the toes are covered to just

short of the tarsus joint conjoining the toe with the foot. The device affixes to the boot by sliding it into the shaping cardboard normally built into the boot. It slides in and is glued as it seats in place.

[0017] FIGURE 4 of an overhead view of the arch piece. This portion is built into the sole of the boot. The round portion seats into the lip of the heel cup. The arch piece seats there providing coverage for the underside of the foot. The square or toe side of the piece ends at the distal arch of the foot. The width of the piece is sized to allow the placement of this piece into the bottom of the boot, like an insert.

[0018] FIGURE 5 is a side view of the arch piece. This is the same piece as in Figure 4. The upwards curvature of the middle of the piece supports the natural arch of the foot, supporting while it protects. The natural sole of the boot while require molding to ensure a fit.

CLAIMS

What is claimed is:

1. A series of protective shaped panels for the foot, comprising:

a series of molded plates which are design to provide the basic boot protection to the front and top of the toe, the rear and sides of the heel, and the bottom of the foot; three segments to be built into the boot itself;

a series of plates which do not hamper the natural range of motion of the foot at rest or at any portion of the natural range of motion; and

a series of plates designed to provide supplemental protection against impact, penetration and blast.

2. A method of construction which integrates the ballistic material into the current process of boot manufacture:

ballistic plates seat into synthetic material which is already sewn into the construction of the boot;

ballistic material shall be comprised of a rigid or semi rigid ballistic material to include aramid fibers, high molecular weight polyethylene, a combination of these, or other high performance fiber types.

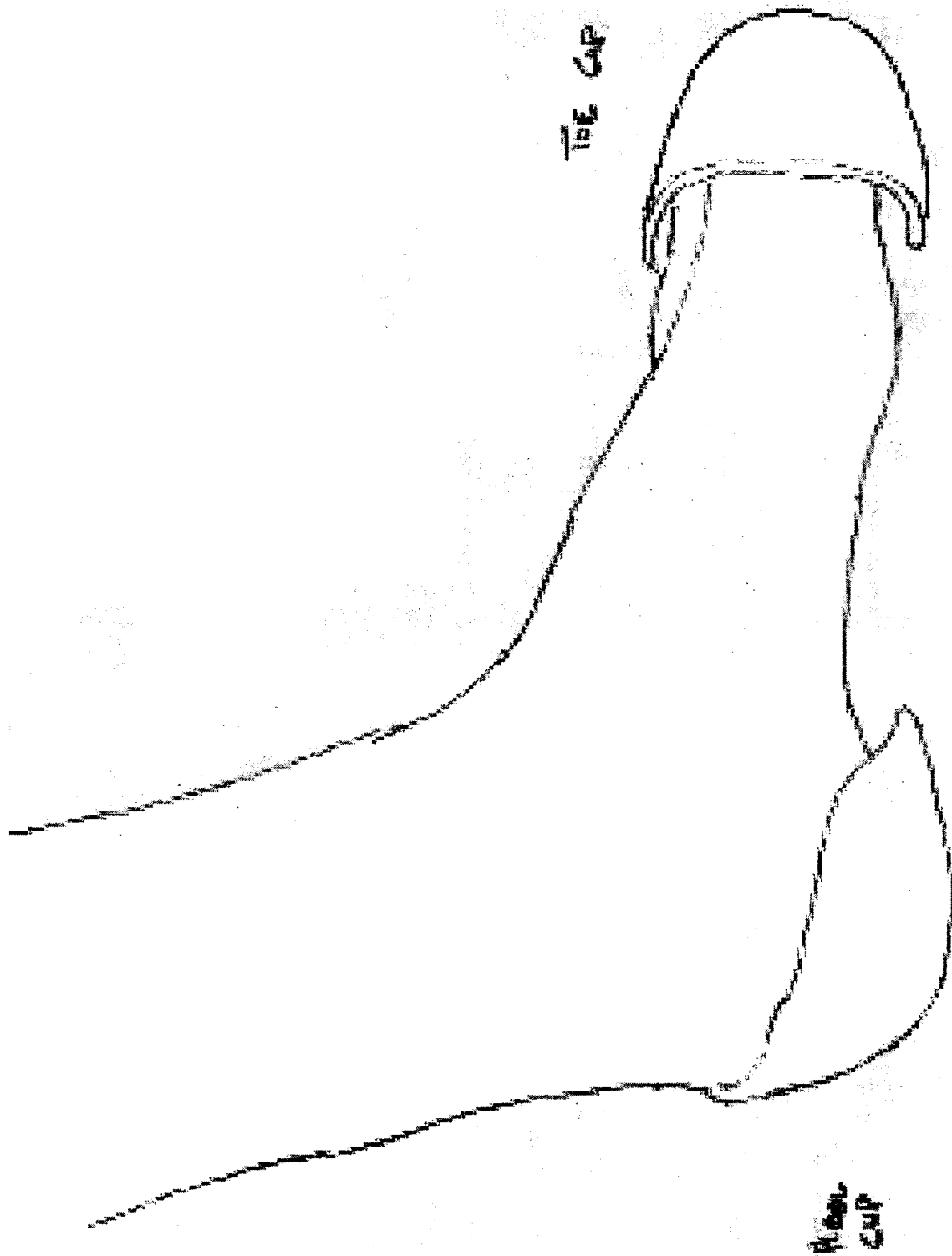


FIGURE 1

HEEL PIECE
OF HEEL

SOLE HEEL

HEEL TO HEEL HEAD

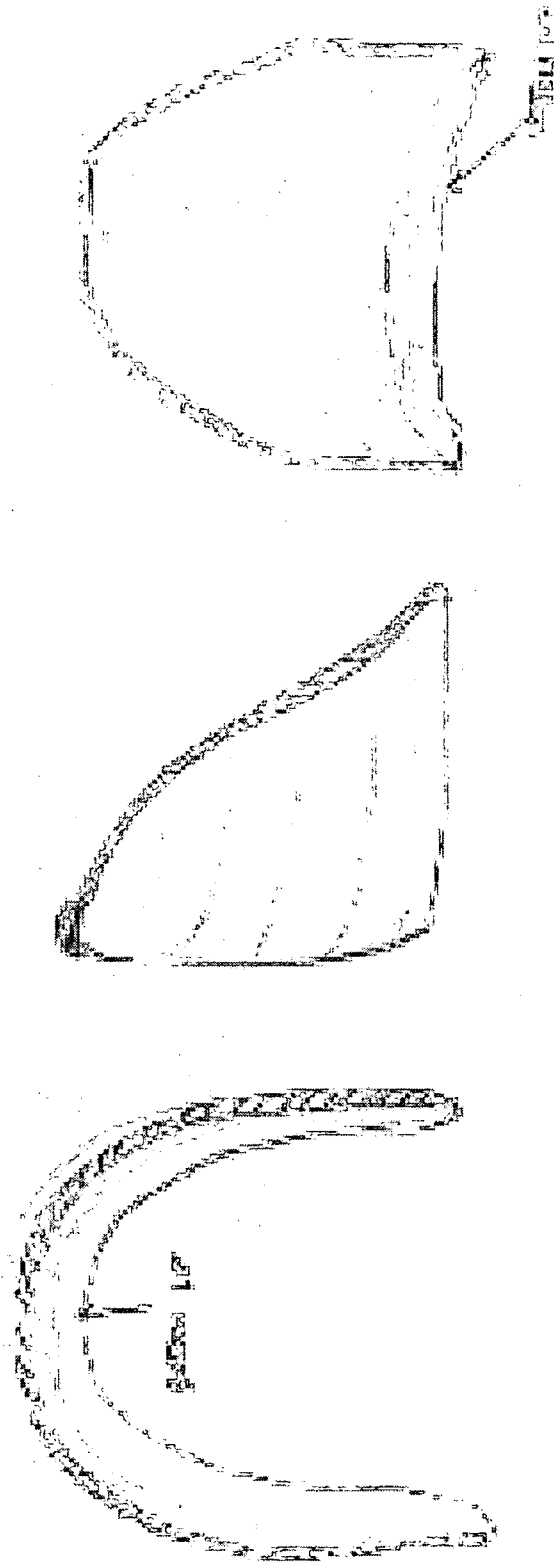


FIGURE 2

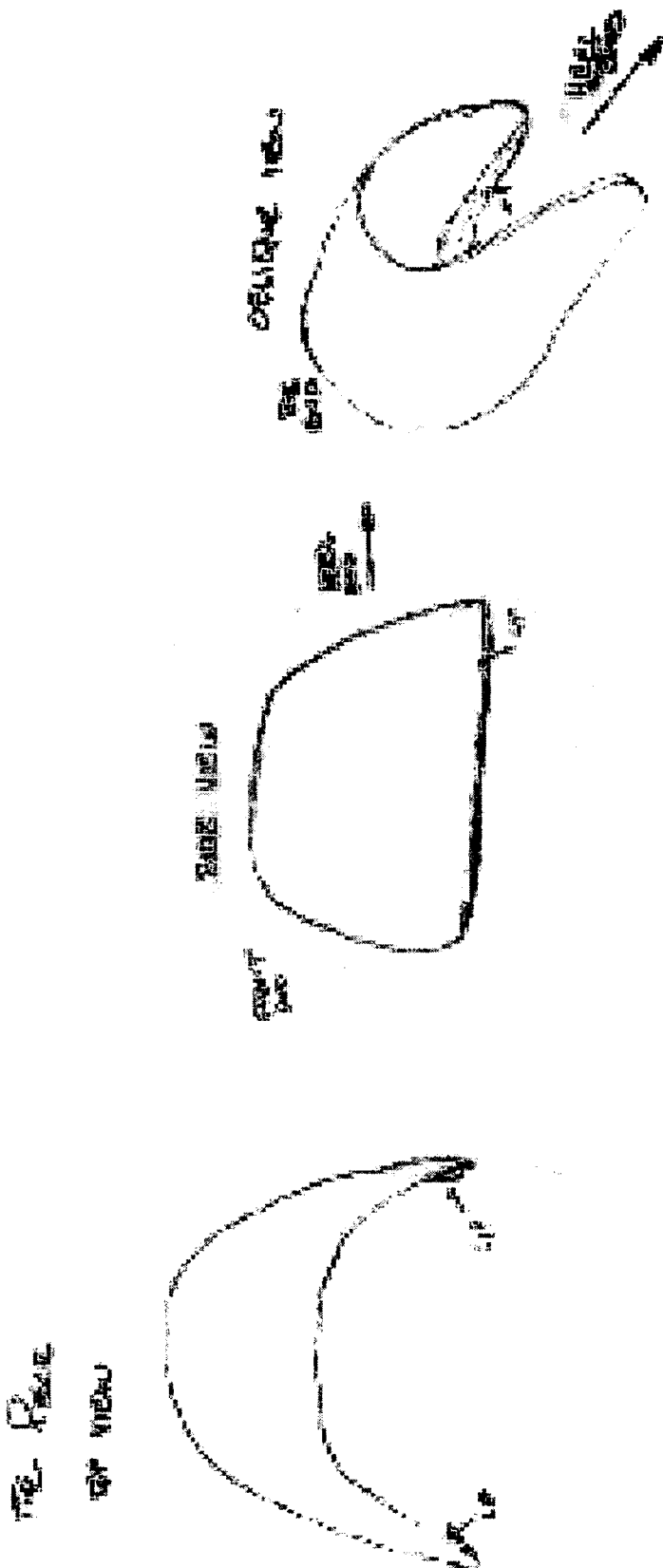


FIGURE 3

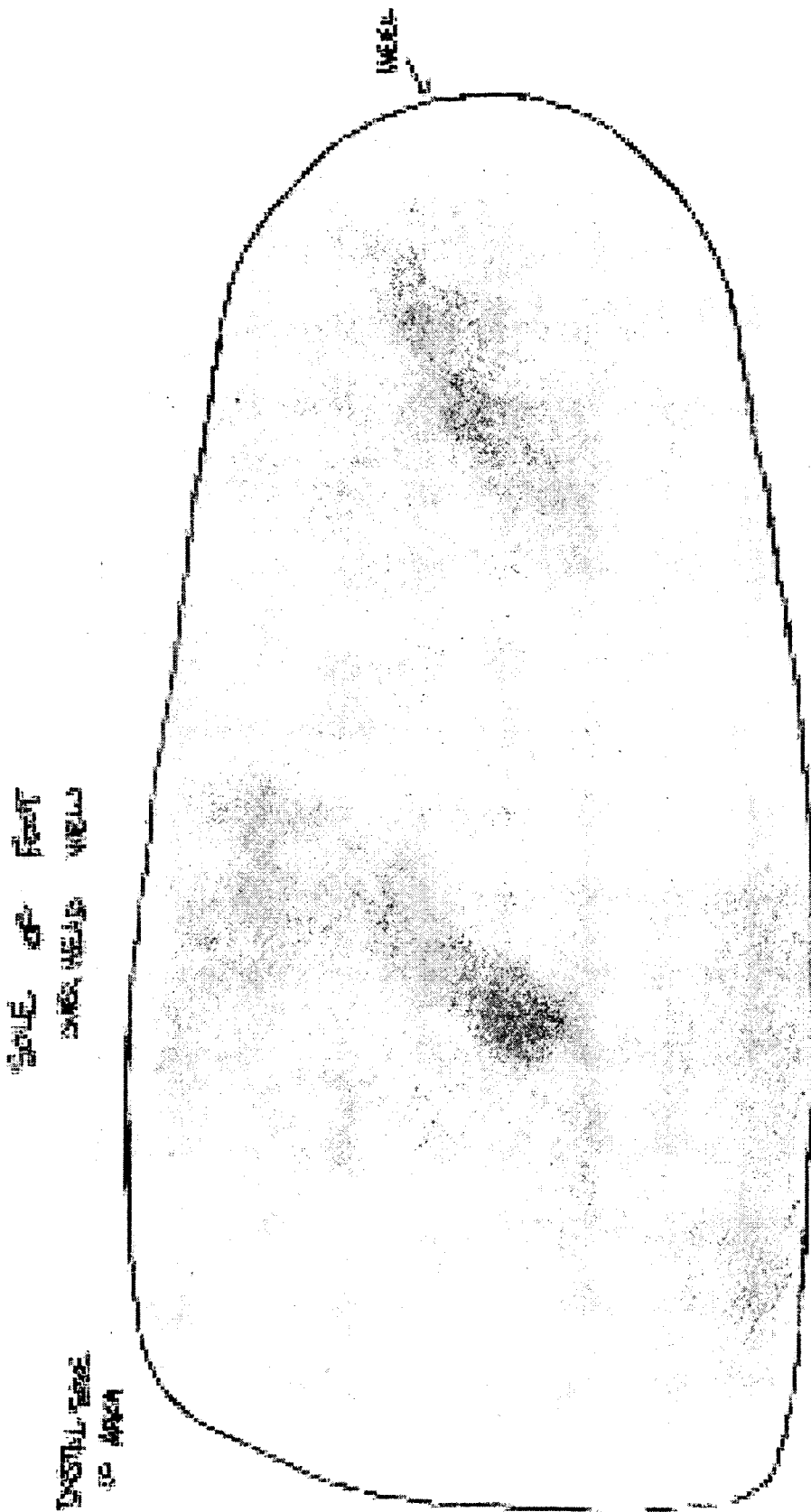
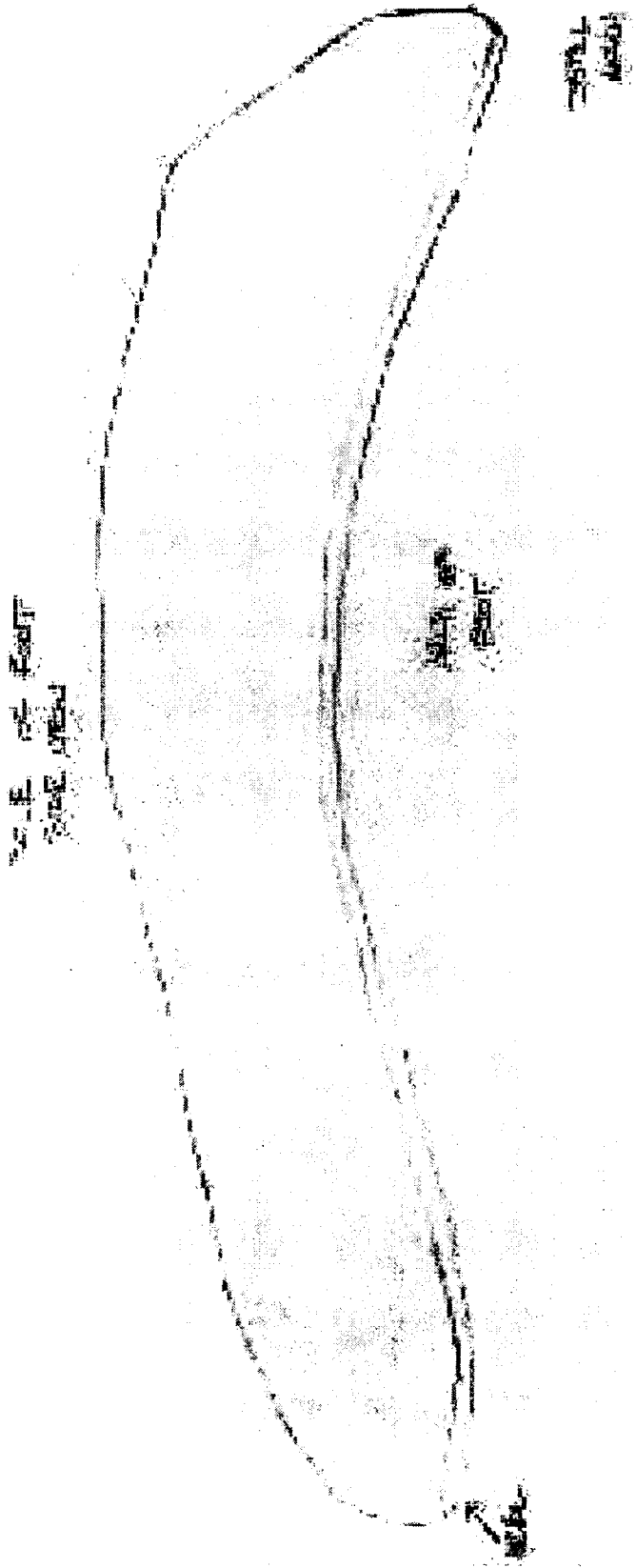


FIGURE 4



INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2008/004995

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - F41H 1/02 (2008.04)

USPC - 36/96

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - A43B 7/14; F41H 1/02 (2008.04)

USPC - 2/2.5; 36/72C, 96

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

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

Patbase

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 97/43919 A1 (VAZ) 27 November 1997 (27.11.1997) entire document	1-2
Y	US 2002/0129517 A1 (DIAZ) 19 September 2002 (19.09.2002) entire document	1-2
Y	US 5,966,747 A (CRUPI et al) 19 October 1999 (19.10.1999) entire document	2
A	US 2001/0007179 A1 (MITCHELL) 12 July 2001 (12.07.2001) entire document	1-2

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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