

Description

FOOTWEAR WITH MULTIPLE LAYERS OF CUSHION

5 Technical Field of the Invention

This invention pertains to a footwear with multiple layers on both the inner and outer soles, specifically to athletic shoes designed to provide comfort and reliability in cushioning shock during sports activities. The sole part of
10 this footwear is composed of several layers of foam components that can damping impacts and pressure from the wearer's feet, as well as provide bounce to a user. The footwear described herein includes various types of shoes, sandals, and hybrid shoe-sandals.

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Background of the Invention

A footwear typically consists of at least three major parts which include the upper part which covers the foot and the area above it, the inner sole which is the part of the
20 sole that comes into contact with the sole, and the outer sole as the cover of the sole. Various developments have been made to those three major parts. Developments are made to meet the need for comfortable, protective, and durable shoes. In terms of comfort, as one of the goals of this invention, none of the
25 previous technologies can provide complete comfort to the wearer, especially when using the shoes for a period of time while standing and conducting sports activities, such as walking, running, or combination of both.

This invention is primarily focused on the development of
30 the inner sole, where no previous technology has truly addressed fatigue and soreness resulting from a prolonged standing while wearing shoes, and providing bounce to a user, especially for athletic footwear. As we know, shoes used for sports such as running, brisk walking, badminton, volleyball,

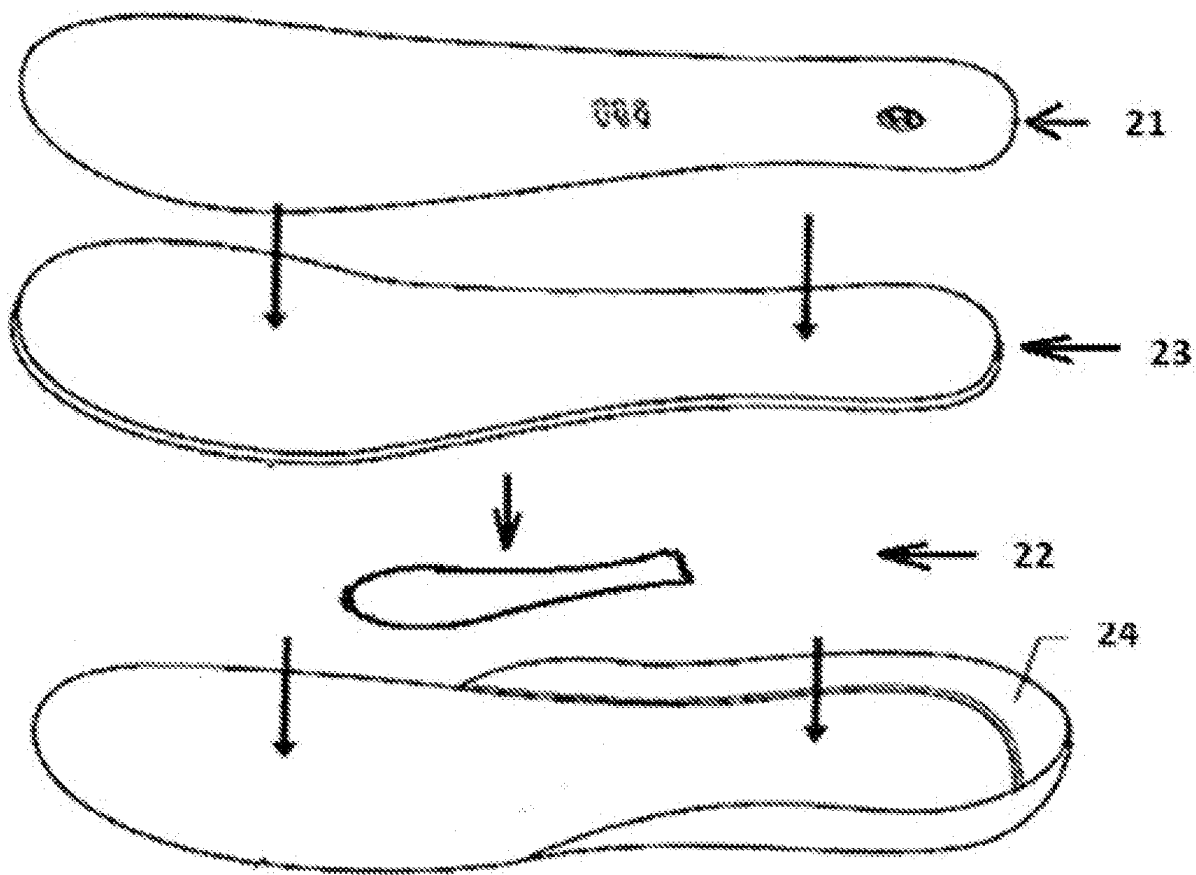
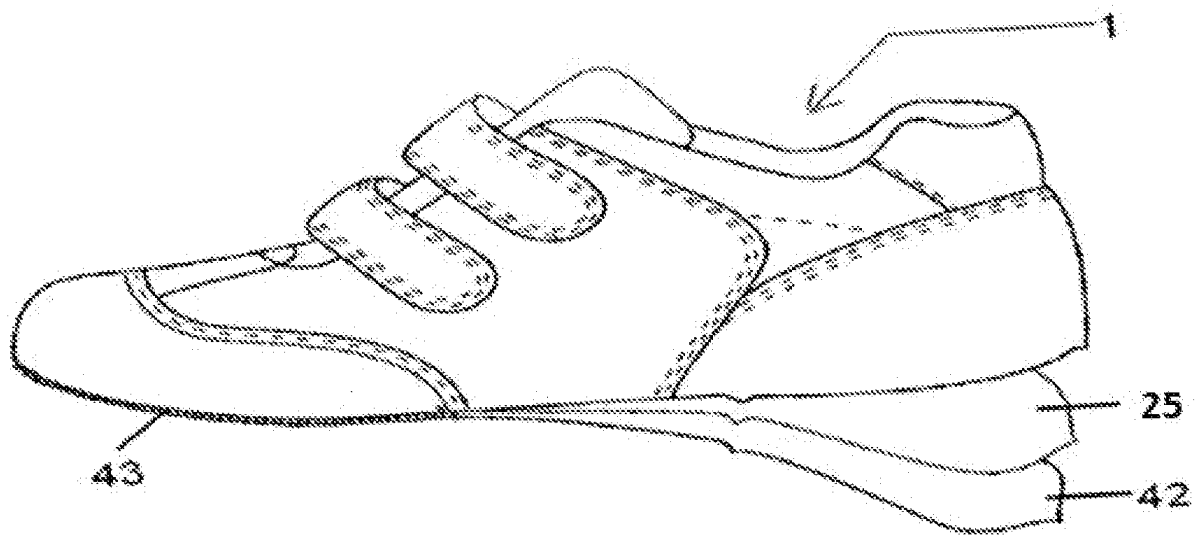


Figure. 1

a middle inner layer;

a molded cup insole of the inner sole, shaped to fit the user's foot, also serving to enhance body posture stability during standing and walking, which includes:

5 and

a stabilizer layer providing bounce to the user;

a layer of front absorber and back absorber; and an outer sole layer with front indentations to accommodate the front absorbing layer and rear indentations to accommodate the back absorbing layer.

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The molded cup insole of the inner sole consists of several cushioning layers designed to absorb weight and shock from above.

Thus, all components of the footwear, both the inner and outer soles, have been explained. The positioning and using of the pressure absorbing and bouncing layers is the most important parts. Therefore, in this invention, the placement of the bounce layers plays a significant role.

20 **Brief Description of Illustrations**

This invention further includes illustrative drawings as examples of the invention disclosure, where:

Figure 1 illustrates the layers of the inner sole of a sports shoe;

25 Figure 2 illustrates the layers of the outer sole according to this invention;

Figure 3 illustrates the layers of the inner sole in reality according to this invention.

30 **Full Explanation for Inversion**

The invention will be further explained taking into account the accompanying illustrations provided in this description. These illustrations are purely illustrative examples intended to facilitate understanding of the invention

and not to limit it. The reference numbers in the illustrations are intended solely to aid comprehension, and the use of arrows without reference numbers indicates the direction of attachment, connection, or insertion of the depicted components.

In the embodiment of this invention, firstly, referring to Figure 1, a layer arrangement is shown on the inner sole part after the upper part of the footwear (41-43), which if started from the top downwards respectively at least includes:

10 a base layer (21) that is directly in contact with the user's sole of the foot;

 a layer of air pockets (22) that can cushion impacts from above;

 a middle inner layer (23);

15 a molded cup insole of the inner sole (24) that is shaped to fit the user's foot, and serving to enhance body posture stability during standing and walking: and

 a stabilizer layer (25) that is providing bounce to the user;

20 a front cushioning layer (52) and a rear cushioning layer (51); and

 an outer sole layer (7) with front indentations (72) on its upper side to accommodate the front cushioning layer (52) and rear indentations (71) to accommodate the rear cushioning layer (51).

25 The moulded cup insole of the inner sole (24) consists of several cushioning layers designed to absorb weight and impact from above.

Returning to the accompanying illustrations provided in this description, it is evident in Figure 1 an inner sole including:

30 a textile liner (21) preferred from natural leather material which serves as a soft and cushy pad directly in contact with the user's sole. The textile liner (21) can

reduce the slippery effect during usage. The surface portion of the leather layer in contact with the user's sole is made smooth and even to enhance long-term comfort and prevent heat build-up and odour. The natural leather layer is preferably
5 perforated for air circulation and preferred to have a thickness of around 0.8 mm;

a layer of air pockets (22) wrapped in a sheet of 0.3 mm thick mica (31), preferably with air pockets in its centre;

the cushioning layer (23) is made to absorb mid-foot
10 pounds;

a moulded cup insole of the inner sole (24), also known as a performance insole, comprises several cushioning layers to provide good shock absorption performance for the foot. It is moulded to fit the shape of the user's foot and also
15 serves to enhance body posture stability during standing and walking. This cup insole (24) has a rim around its outer circumference, especially near the heel, to enhance user stability;

a stabilizer layer (25), which is a specialized
20 cushioning layer that provides bounce, assisting athletes during sports activities. With its bounce, the stabilizer layer (25) aids athletes in their sporting endeavours, reducing fatigue.

Furthermore, still referring to Figures 2 and 3, it can
25 be observed that the outer sole (7) has front top indentations (72) and rear top indentations (71), each of which can be entered by the rear pressure absorbers (51) placed beneath the stabilizer (25).

Returning to Figure 1, the upper part of the shoe (1) has
30 a Strobel layer (41) positioned in the middle layer to provide a strong Strobel construction, thereby enhancing sensitivity and flexibility. This Strobel layer (41) is attached by stitching to the preferred 8 oz canvas inner sole. The Strobel

layer of the inner sole (41) is also preferred to extend from the front to the back of the inner sole of the shoe; and

5 a peak performance & stabilizer with a Strobel reinforcement layer (42) preferred from porous material to allow for air circulation. The material used is 4 oz canvas, which has good flexibility and durability. This reinforcement layer (42) is also preferred to extend from the front to the back of the inner sole of the shoe. Both Strobel (41) and Strobel reinforcement (42) materials are stitched with the
10 upper sole (43), thus serving as a separator between the inner and upper outer soles.

Next, the foam layer specific to the stabilizer (25) as seen in Figure 1, which serves as a cushion, is a layer made of a material capable of allowing air passage and having high
15 shock absorption capability. The preferred material for this specific foam layer (25) is an open-cell foam from microcellular polyurethane damping material, particularly red poron foam marketed by Rogers Corporation, or a dual-layer consisting of this red poron foam material. The damping
20 material for the foam layer (25) has the ability to withstand impact, with a value approximately measured between 0.3 and 2.5 seconds if tested using ASTM D2632-92, "Vertical Rebound" testing, and compression recovery time (recovery) of 90%. This compression recovery time refers to the time required by a
25 material that undergoes elastic deformation due to compression to return to 90% of the volume loss caused by the action. Regarding thickness, this foam layer (25) has a greater thickness than the surrounding layers, ranging between 2 mm and 6 mm, preferably around 3 mm. Furthermore, the
30 characteristics of this specific damping layer (25) can be seen in the table below:

PROPERTY	THICKNESS RANGE mm (inch)	DENSITY g/cm ³ (lb/ft ³)	WEIGHT/PAIR g/pair (oz/pair)	COMPRESSION FORCE DEFLECTION kPa (psi)	ASKEPIC (for reference only)	COMPRESSION SET %	RESILIENCE	SHOCK ABSORPTION Hz (lb)
TYPICAL RESULT	2.5 - 4 (0.098 - 0.158)	256 (16)	54 (1.9)	124 (18)	See Compression Force Deflection for specification of foam firmness.	< 10	46	11.8 (2653)
TEST METHOD	—	ASTM D 3574 TEST A	Based on 3mm thickness and approximately 0.07m ² per pair	Based on ASTM D 1056; 25% deflection, 0.51 cm/min (0.2" /min) strain	ASTM D 2240	ASTM D 3574 Test D at 70°C (158°F)	ASTM D 2632	ASTM F 1614 3mm thick

Furthermore, one skilled in the art of this technology will understand that the embodiments of this invention as shown in the illustrations and described above are exemplary and not intended to limit the scope of this invention. It is also understood that this invention can be modified, improvised within the scope of this invention, which will be limited by the following claims.

Claims:

1. A footwear with multiple layers of cushioning forming the insole portion after the upper body portion of the foot wear (41-43) if started from top downward to bottom consecutively at least include:
- a base layer (21) that is in direct contact with the sole of the user's foot;
 - a layer of air pockets (22) that can absorb impact from above;
 - a layer in the center (23);
 - an insole cup (24) that is molded to fit the shape of the sole, and also serves to improve postural stability while standing and walking which includes: and
 - a peak performance & stabilizer layer with a strobe booster (42) that gives bounce power to the wearer;
 - a front damper layer (52) and a rear damper layer (51); and
 - an outer sole layer (7) on its upper side having front indentations (72) accommodated the front damping layer (52) and the rear indentations (71) accommodated by the rear damping layer (51) placed beneath the stabilizer.
2. The footwear with multiple layers of cushioning as claimed in Claim 1, wherein the peak performance & stabilizer layer with Strobel reinforcement (42) is a layer that can provide bounce power to the user and it is an open cell foam of microcellular polyurethane damping material.
3. The footwear with multiple layers of cushioning as claimed in Claim 1, wherein the peak performance & stabilizer layer with Strobel reinforcement (42) has a greater thickness than the adjacent layers in the range between 2 mm and 6 mm, preferably around 3 mm.