

A HEIGHT ADJUSTABLE MODULAR HEEL

FIELD OF INVENTION

- 5 The invention relates to a height adjustable shoe. More particularly, the invention relates to a shoe heel formed by modular pieces which are stackable and interchangeable to allow for customization of the shoe heel height.

BACKGROUND OF THE INVENTION

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Women often require a variety of shoes for different occasions and needs, from casual wear to formal events. It is not uncommon for a woman to change shoes a few times in a day to match her outfit or the activity she is engaged in. This means carrying multiple pairs of shoes can become quite cumbersome. Among the various types of shoes, high-heeled shoes are one of the most popular styles worn by women. These shoes typically feature a raised shoe heel at the back of the shoe, which can range from a few inches to several inches in height. The heel can be made of various materials, such as plastic, wood or metal, and can be designed in various shapes and styles. The added height can create an illusion of longer legs, improve posture and enhance the overall appearance of a wearer.

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However, high-heeled shoes also have their limitations. A conventional heel for such shoes is typically a fixed-height heel that is permanently affixed to the shoe. The main drawback is that such a heel is not customizable in height or replaceable with other designs to fit different types of activities and occasions. The fixed height of the heel can also cause discomfort or pain when worn for extended periods and may even cause injury or long-term damage to the feet and legs. In addition, some activities, such as walking on uneven surfaces or participating in athletic activities, may not be practical or safe in high heels. Furthermore, the fixed-height heel is more likely to wear down or break over time. This can be particularly problematic for shoes that are worn frequently or for extended periods of time.

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To address these issues, there is a growing demand for height-adjustable shoes that

can provide the benefits of high heels while also allowing the wearer to customize the height of the heel based on their needs and preferences.

Over the years, there are several height adjustable shoes available in the market.

5 These shoes typically feature a one-piece removable heel that can be switched out as needed, providing greater flexibility and versatility for women who value both fashion and function. However, there is still a need to carry multiple one-piece heels of various heights for a woman who needs to change shoes of different heights a few times in a day to match her outfit or the activity she is engaged in, and this is quite
10 cumbersome.

There are also several patents related to customizable high heels. US20080263898A1 discloses a shoe with a heel which itself is height adjustable. The heel comprises a heel base and a plurality of identical rectangular heel columns which are stacked on
15 one another in a vertical manner to form a length of the desired heel height. The heel height can be customized by varying the number of stacked heel columns. A sliding lock and secure mechanism are provided to allow easy attachment or detachment of the heel components. However, such straight heel has a shortcoming in that it is ergonomically and anatomically impossible for a person's heel or back portion of the
20 sole to be horizontally flattened after elevation. Such design of shoe sole does not conform to the shape of a human foot and therefore creates pressure points on the foot, leading to pain, discomfort and an increased risk of injury. Moreover, it cannot provide the same level of stability and balance at different heights. For certain heights, the foot is forced to balance on a narrower base, which can be challenging
25 and increase the risk of tripping or falling.

Accordingly, it would be desirable to provide a height-adjustable shoe that is capable of overcoming the aforementioned drawbacks. This invention provides such a shoe heel.
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SUMMARY OF INVENTION

In a first aspect of the invention, there is provided a height adjustable modular heel for

use in a shoe, comprises a heel body having a first end detachably attached to a heel base that is affixed to the shoe and a second end detachably attached with a heel cap to protect the heel body from wear and tear, wherein the heel body is formed by identical heel body pieces that are detachably attached together in a stacking manner to form a desired height for the heel depending on a number of the heel body pieces stacked, and wherein the heel body pieces are interchangeable and stackable in any sequence to allow for customization of the heel height, characterised in that the heel, assembled by the heel base, the heel body and the heel cap, forms an arc of a predetermined radius to achieve same or similar level of ergonomics at different heights.

Preferably, the heel base, the heel cap and the identical heel body pieces each may include at least one joint surface which is slanted at a predetermined degree such that the assembled heel forms the arc of the predetermined radius.

Preferably, the at least one joint surface may include a snap fit mechanism or a twist lock mechanism to connect two adjacent components of the heel together.

Preferably, the snap fit mechanism may include a protrusion and a recess for receiving the protrusion, one of which is provided with at least one locking tab and the other is provided with at least one corresponding groove, wherein when in use, the locking tab snaps into place in the groove for securing the protrusion in the recess.

Preferably, the twist lock mechanism may include a male component having at least one tab and a female component having at least one corresponding slot, wherein when in use, the tab engages with the slot and being rotated in a predetermined direction to connect and lock the male and female components, and being rotated in an opposite direction to release and unlock the male and female components.

In a second aspect of the invention, there is provided a shoe comprises an upper portion which at least partially covers a foot, a sole disposed beneath the upper portion to come into contact with the ground, and a height adjustable modular heel connected to the sole to raise part of the sole off the ground, wherein the heel includes

a heel body having a first end detachably attached to a heel base that is affixed to the sole of the shoe and a second end detachably attached with a heel cap to protect the heel body from wear and tear, wherein the heel body is formed by identical heel body pieces that are detachably attached together in a stacking manner to form a desired height for the heel depending on a number of the heel body pieces stacked, and wherein the heel body pieces are interchangeable and stackable in any sequence to allow for customization of the heel height, characterised in that the heel, assembled by the heel base, the heel body and the heel cap, forms an arc of a predetermined radius to achieve same or similar level of ergonomics at different heights.

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Preferably, a shank can be provided to which the heel can be connected thereto to distribute weight and reduce fatigue by providing additional support to an arch of the foot.

15 Preferably the heel base, the heel cap and the identical heel body pieces each may include at least one joint surface which is slanted at a predetermined degree such that the assembled heel forms the arc of the predetermined radius.

Preferably, the at least one joint surface may include a snap fit mechanism or a twist lock mechanism to connect two adjacent components of the heel together.

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Preferably, the snap fit mechanism may include a protrusion and a recess for receiving the protrusion, one of which is provided with at least one locking tab and the other is provided with at least one corresponding groove, wherein when in use, the locking tab snaps into place in the groove for securing the protrusion in the recess.

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Preferably, the twist lock mechanism may include a male component having at least one tab and a female component having at least one corresponding slot, wherein when in use, the tab engages with the slot and being rotated in a predetermined direction to connect and lock the male and female components, and being rotated in an opposite direction to release and unlock the male and female components.

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The preferred embodiment of the invention consists of novel features and a

combination of parts hereinafter fully described and illustrated in the accompanying drawings and particularly pointed out in the appended claims; it being understood that various changes in the details may be effected by those skilled in the arts but without departing from the scope of the invention or sacrificing any of the advantages of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For the purpose of facilitating an understanding of the invention, there is illustrated in the accompanying drawing the preferred embodiments from an inspection of which when considered in connection with the following description, the invention, its construction and operation and many of its advantages would be readily understood and appreciated.

Fig. 1 illustrates a perspective view of a height adjustable modular heel attached with three heel body pieces.

Fig. 2A illustrates a side view illustrating a height adjustable modular heel without heel body pieces.

Fig. 2B illustrates a side view illustrating the height adjustable modular heel attached with one heel body piece.

Fig. 2C illustrates a side view illustrating the height adjustable modular heel attached with two heel body pieces.

Fig. 2D illustrates a side view illustrating the height adjustable modular heel attached with three heel body pieces.

Fig. 3 is an exploded perspective view illustrating a first exemplary of a fastening mechanism.

Fig. 4 is an exploded side view illustrating the first exemplary of the fastening

mechanism.

Fig. 5 is another exploded perspective view illustrating a the first exemplary of the fastening mechanism.

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Fig. 6 is an exploded perspective view illustrating a second exemplary of the fastening mechanism.

DETAILED DESCRIPTION OF THE INVENTION

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Hereinafter, the invention shall be described according to the preferred embodiments of the present invention and by referring to the accompanying description and drawings. However, it is to be understood that limiting the description to the preferred embodiments of the invention and to the drawings is merely to facilitate discussion of the present invention and it is envisioned that those skilled in the art may devise various modifications without departing from the scope of the appended claims.

In a broader context, the drawings depict a shoe that has the ability to be adjusted in height according to the specific needs or desires of a wearer. Although the drawings depict only certain components of the shoe that are necessary for describing the invention, it is understood that other common components of a shoe that are not shown in the drawings could also be included in the invention without any difficulty depending on the style and purpose of the shoe. Such common components can include, but is not limited to, upper portion, lining, shank and counter.

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The upper portion is the part of the shoe that covers a foot of the wearer. It can be made of a variety of materials, such as leather, suede or synthetic fabrics, and can be decorated with various embellishments, such as buckles, straps or studs.

30 The lining is the interior material of the shoe that covers the insole and surrounds the foot. It can be made of a variety of materials, such as leather, fabric or synthetic materials, and provides a comfortable and breathable environment for the foot.

The shank is a component located between the insole and the outsole, which provides structural support and stability to the shoe. It can be made of metal, composite materials or any other materials that possess sufficient flexibility in order for the shoe to bend according to the height of the heel. The shank is often used in high-heeled shoes to help distribute weight and reduce fatigue.

The counter is a component located at the back of the shoe that provides support and structure to the heel. It can be made of a variety of materials, such as plastic, fibreboard or leather, and helps to keep the foot in place.

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Referring to **Figs. 1** and **2A to 2D**, the shoe as illustrated therein comprises a sole (1) with a height adjustable modular heel (2). By way of example, the sole (1) can be formed by an insole and an outsole. The insole is an inner layer of the sole, which provides cushioning and support directly beneath the foot. Preferably, the insole can be made of foam, gel or any other soft material which is designed to improve comfort, absorb shock and prevent foot fatigue. The outsole, on the other hand, is the outer layer of the sole that is in direct contact with a ground. Preferably, the outsole can be made of rubber, polyurethane, woods or any other material which is designed to be durable and provide good traction.

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Preferably, the height adjustable modular heel (2) is connected to a rear portion of the sole (1). In a further embodiment, the height adjustable modular heel (2) is detachably attached to the sole (1) with a shank or support structure to provide additional support and stability to the foot, as well as to distribute the weight of the shoe more evenly. The shank is also sufficiently flexible to allow the shoe to bend according to the height of the heel (2). By way of example, the height adjustable modular heel (2) comprises a heel body (22), a heel base (21), and a heel cap (23). Preferably, the heel base (21) is affixed to the rear portion of the sole (1) to ensure that a first end of the heel body (22) is securely attached to the shoe in a detachable manner and can withstand the weight and movement of the wearer. The heel base (21) can be attached to the sole (1) via a threaded fastener (3) such as screw or nut and bolt. The heel base (21) can be made of various rigid materials, such as wood, plastic or metal. Preferably, the heel cap (23) is detachably attached to a second end of the heel body

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(22) to protect the heel body (22) from wear and tear. The heel cap (23) is the part that comes into contact with the ground and so it can be made from the same material of the outsole.

5 Preferably, the heel body (22) is formed by identical heel body pieces (22A) that are detachably attached together in a stacking manner. As shown in **Figs. 2B to 2D**, different number of the identical heel body pieces (22A) can be stacked, in any sequence, to form different heights for the height adjustable modular heel (2). Due to the detachability of the heel body pieces (22A), the wearer can customize the height
10 of the height adjustable modular heel (2) by adjusting the number of stacked heel body pieces (22A). As shown in **Fig. 2A**, it is also possible that the heel body (22) is completely removed. In this embodiment, the heel cap (23) is then directly attached to the heel base (21) in a detachable manner. The heel body piece (22A) can be made of various materials, such as wood, plastic or metal.

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It is important that the height adjustable modular heel (2), which is assembled by the heel base (21), the heel body (22) and the heel cap (23), forms an arc or curvature of a predetermined radius. The radius of the arc or curvature may vary depending on the size of the shoe. The arc-shaped heel (2) can achieve same or similar level of
20 ergonomics for the shoe at different heights as compared to straight heel. Furthermore, the arc-shaped heel (2) can provide better stability and balance because the arc or curvature fits more snugly to the natural shape of the foot, thereby it can distribute weight more evenly. Moreover, the arc-shaped heel (2) can also help to improve posture by providing better support to the arch of the foot, which can help to prevent
25 overpronation and other issues that can lead to poor posture. Last but not least, the arc-shaped heel (2) is often considered more stylish and trendier than straight heels.

In order to achieve the arc shape, the heel base (21), the heel cap (23) and the identical heel body pieces (22A) each includes at least one joint surface which is
30 slanted at a predetermined degree such that the assembled heel (2) forms the arc shape. Preferably, the at least one joint surface may include a snap fit mechanism or a twist lock mechanism to connect two adjacent components (21, 22A, 23) of the height adjustable heel (2) together. The joint surface may also adopt other fastening

mechanisms such as magnets, screws, nuts and bolts, rivets, hook and loop or tongue and groove.

Referring to **Figs. 3-5**, an exemplary of the twist lock mechanism is illustrated. In general, the twist lock mechanism may include a male component (41) and a female component (42). The male component (41) may include at least one tab (43) and the female component (42) may include at least one corresponding slot (44) that is sized to receive the tab (43) of the male component (41). The slot (44) has a base portion that corresponds to the shape of the tab (43) and a tapered or angled portion that extends radially inward from the base portion. To connect and lock the male and female components (41, 42), the male component (41) is inserted into the female component (42) and rotated in a predetermined direction. The tab (43) engages with the slot (44), causing the male component (41) to be drawn into the female component (42). The tab (43) then snaps into place in the slot (44), securing the male and female components (41, 42) together. To release and unlock the connection, the male component (41) is rotated in the opposite direction, causing the tab (43) to disengage from the slot (44). Referring again to **Figs. 3-5**, the male component (41) is provided on each top joint surface of the heel cap (23) and heel body pieces (22A), while the female component (42) is provided on each bottom joint surface of the heel base (21) and heel body pieces (22A). Nevertheless, it should be understood that the configuration of the male and female components (41, 42) may vary to suit specific applications and requirements, for example, the shape and size of the tab (43) and slot (44) may vary; or the male component (41) can be provided on the bottom joint surface while the female component (42) can be provided on the top joint surface.

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Referring to **Fig. 6**, an exemplary of the snap fit mechanism is illustrated. In general, the snap fit mechanism may include a protrusion (51) configured to fit securely into a recess (52), one of which is provided with at least one locking tab (not shown) and the other is provided with at least one corresponding groove (53), wherein when in use, the locking tab snaps into place in the groove (53) for securing the protrusion (51) in the recess (52). The protrusion (51) and recess (52) are configured to create a snap fit, which allows the protrusion (51) and recess (52) to be connected/locked and disconnected/unlocked easily. Referring again to **Fig 6**, the protrusion (51) is

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provided on each top joint surface of the heel cap (23) and heel body pieces (22A), while the recess (52) is provided on each top bottom joint surface of the heel base (21) and heel body pieces (22A). The recess (52) includes two locking tabs (not shown) and the protrusion (51) includes two corresponding grooves (53). When a force is applied to protrusion (51), it causes the locking tabs to deform or flex slightly so that the protrusion (51) can be inserted into the recess (52). Once the protrusion (51) is fully inserted into the recess (52), the locking tabs snap into place in the grooves (53), creating a secure and reliable connection/locking configuration between the protrusion (51) and recess (52). The connection can be released by applying a force to the protrusion (51) in the opposite direction, causing the locking tabs to flex and release from the grooves (53) so that the protrusion (51) can be removed from the recess (52). Nevertheless, it should be understood that the configuration of the protrusion (51) and recess (52) may vary to suit specific applications and requirements, for example, the shape and size of the protrusion (51), recess (52), locking tab and groove (53) may vary; more than one protrusion (51) and recess (52) may be provided; or the protrusion (51) can be provided on the top joint surface while the recess (52) can be provided on the bottom joint surface.

The present disclosure includes as contained in the appended claims, as well as that of the foregoing description. Although this invention has been described in its preferred form with a degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of construction and the combination and arrangements of parts may be resorted to without departing from the scope of the invention.

CLAIMS

1. A height adjustable modular heel (2) for use in a shoe, comprising:
 - a heel body (22) having a first end detachably attached to a heel base (21) that is affixed to the shoe and a second end detachably attached with a heel cap (23) to protect the heel body (22) from wear and tear,
 - wherein the heel body (22) is formed by identical heel body pieces (22A) that are detachably attached together in a stacking manner to form a desired height for the heel (2) depending on a number of the heel body pieces (22A) stacked; and
 - wherein the heel body pieces (22A) are interchangeable and stackable in any sequence to allow for customization of the heel height,
 - characterised in that the heel (2), assembled by the heel base (21), the heel body (22) and the heel cap (23), forms an arc of a predetermined radius to achieve same or similar level of ergonomics at different heights.
2. The height adjustable modular heel (2) according to claim 1, wherein the heel base (21), the heel cap (23) and the identical heel body pieces (22A) each includes at least one joint surface which is slanted at a predetermined degree such that the assembled heel forms the arc of the predetermined radius.
3. The height adjustable modular heel (2) according to claim 2, wherein the at least one joint surface includes a snap fit mechanism or a twist lock mechanism to connect two adjacent components (21, 22A, 23) of the heel (2) together.
4. The height adjustable modular heel (2) according to claim 3, wherein the snap fit mechanism includes a protrusion (51) and a recess (52) for receiving the protrusion (51), one of which is provided with at least one locking tab and the other is provided with at least one corresponding groove (53), wherein when in use, the locking tab snaps into place in the groove (53) for securing the protrusion (51) in the recess (52).
5. The height adjustable modular heel (2) according to claim 3, wherein the twist lock mechanism includes a male component (41) having at least one tab (43) and a

female component (42) having at least one corresponding slot (44), wherein when in use, the tab (43) engages with the slot (44) and being rotated in a predetermined direction to connect and lock the male and female components (41, 42), and being rotated in an opposite direction to release and unlock the male and female components (41, 42).

6. A shoe comprising:

an upper portion which at least partially covers a foot;

a sole (1) disposed beneath the upper portion to come into contact with the ground; and

a height adjustable modular heel (2) connected to the sole (1) to raise part of the sole (1) off the ground,

wherein the heel (2) includes a heel body (22) having a first end detachably attached to a heel base (21) that is affixed to the sole (1) of the shoe and a second end detachably attached with a heel cap (23) to protect the heel body (21) from wear and tear;

wherein the heel body (22) is formed by identical heel body pieces (22A) that are detachably attached together in a stacking manner to form a desired height for the heel (2) depending on a number of the heel body pieces stacked (22A); and

wherein the heel body pieces (22A) are interchangeable and stackable in any sequence to allow for customization of the heel height,

characterised in that the heel (2), assembled by the heel base (21), the heel body (22) and the heel cap (23), forms an arc of a predetermined radius to achieve same or similar level of ergonomics at different heights.

7. The shoe according to claim 6, further comprising a shank to which the heel (2) is connected thereto to distribute weight and reduce fatigue by providing additional support to an arch of the foot.

8. The shoe according to claim 6, wherein the heel base (21), the heel cap (23) and the identical heel body pieces (22A) each includes at least one joint surface which is slanted at a predetermined degree such that the assembled heel (2) forms the arc of the predetermined radius.

9. The shoe according to claim 8, wherein the at least one joint surface includes a snap fit mechanism or a twist lock mechanism to connect two adjacent components (21, 22A, 23) of the heel (2) together.
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10. The shoe according to claim 9, wherein the snap fit mechanism includes a protrusion (51) and a recess (52) for receiving the protrusion (51), and one of which is provided with at least one locking tab and the other is provided with at least corresponding one groove (53), wherein when in use, the locking tab snaps
- 10 into place in the groove (53) for securing the protrusion (51) in the recess (52).
11. The shoe according to claim 9, wherein the twist lock mechanism includes a male component (41) having at least one a tab (43) and a female component (42) having at least one slot (44), wherein when in use, the tab (43) engages with the slot (44)
- 15 and being rotated in a predetermined direction to connect and lock the male and female components (41, 42), and being rotated in an opposite direction to release and unlock the male and female components (41, 42).