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(54) **Shoe with interchangeable heel**

(57) Disclose embodiments include shoes with interchangeable heels permitting a plurality of heel heights and styles, addressing the need for aesthetic appeal, ease of use, comfort, simplicity of design, and sturdiness.

More particularly, disclose embodiments include a modifiable shoe heel consisting of a fixed heel part and an interchangeable heel part removably attachable by a system of magnets.

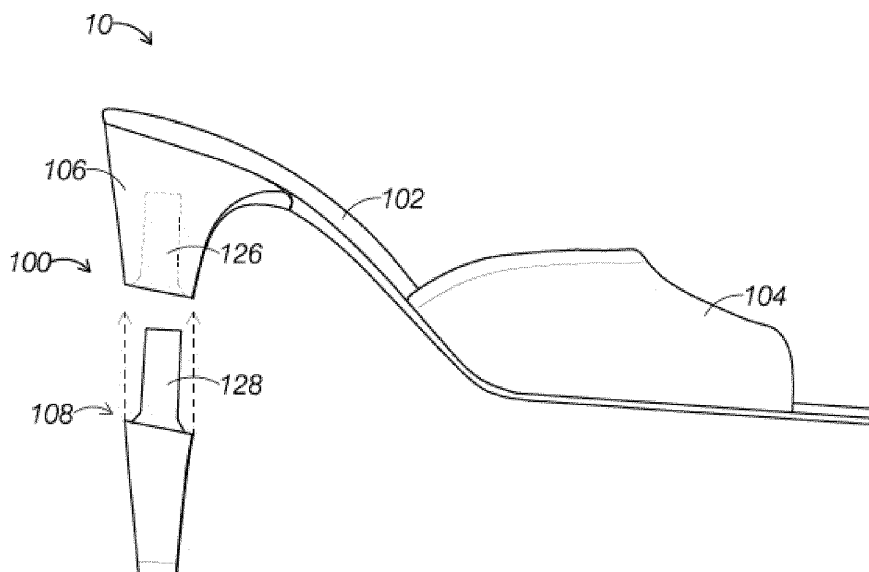


FIG.2

Description

[0001] Disclosed embodiments relate to shoes with interchangeable heels, and more particularly to modifiable shoe heels.

BACKGROUND

[0002] The selection of a shoe to wear is often influenced by the height or style of the shoe heel, with low wide heels primarily used for comfort and mobility, and tall narrow heels for elegance. Active lifestyles often involve long periods of walking or standing, and prolonged wearing of high heels causes tiredness, discomfort, and health problems for the feet. For that reason, the ability to flexibly change shoe heel depending on one's environment and activity is desirable. Numerous designers have attempted to create a shoe with variable heel height and style, yet such designs have not proven successful in addressing the need for aesthetic appeal, ease of use, comfort, simplicity of design, and sturdiness.

[0003] US Pat. No. 5133138 discloses a shoe with a replaceable high heel; however, the disclosed design has a number of drawbacks. Typically, the greatest stress on a shoe's heel is at the top of the heel where it attaches to the sole, and therefore a wide join is advisable. As is evident from figure 1 of the aforementioned disclosure the fixed-heel insert attached to the sole is of lesser width than the top surface of the detachable-heel, and consequently provides less strength than the shoe's non-replaceable heel counterpart provides. Furthermore, the need to maximize the width of the fixed-heel insert for strength, conflicts with the design of narrow heels, since the interchangeable-heel part must house the fixed-heel insert. In addition, due to the wide top surface of the detachable-heel even a slight movement of the heel relative to the sole will result in a noticeable gap between the sole and top edge of the detachable-heel. Moreover, the use of a retractable pin to manually lock and unlock the detachable-heel makes detachable-heel replacement awkward for a wearer of the shoes.

[0004] W091108685 discloses a shoe with a detachable heel. The disclosed design has all of the drawbacks of US Pat. No. 5133138, except that the retractable pin is not required. However, in addition to the shoe upper, sole, fixed-heel insert, detachable-heel, and magnets, all embodiments (shown in figures 1-3) require additional parts for attachment of the detachable heel, such as the metallic insert and associated parts. Due to the non-conical form of the metallic insert, a slight variation in the mechanical tolerances (such as due to temperature) of the metallic insert or its housings will result in either an overly tight join or a loose join with resulting loss of stability. Furthermore, the embodiment shown in figure 1 utilizes annular magnets which exhibit less magnetic force than their similarly-sized non-annular counterparts exhibit, and the embodiment shown in figure 2 utilizes a hollow cylindrical magnet to retain the detachable-heel

even though the resulting magnetic field will inadequately retain the detachable-heel.

[0005] US Pub. No. 20070000152 discloses a bowling shoe with interchangeable plate-type heels with magnetic attachment. This disclosure only addresses the attachment of interchangeable heels that are shallow friction plates, and therefore the manifest challenge of attaching low and high heels to shoes is unanswered by that disclosure.

SUMMARY

[0006] Disclosed embodiments of the shoe with interchangeable heel include: a) a fixed heel part adapted on one end for attachment to a shoe sole and on the other end for removable attachment of an interchangeable heel part; and b) an interchangeable heel part adapted on one end for removable attachment to the fixed heel part and on the other end for contact with the ground. Consequently, the height and style of the heel of a shoe may be adjusted by attachment of the desired interchangeable heel part to the fixed heel part of the shoe.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] Disclosed embodiments are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings.

Figure 1 illustrates a side elevation of an embodiment of a shoe with interchangeable heel, with an attached high heel.

Figure 2 illustrates a side elevation of an embodiment of a shoe with interchangeable heel, with a detached high heel.

Figure 3 illustrates a side elevation of an embodiment of a shoe with interchangeable heel, with an attached low heel.

Figure 4 illustrates a side elevation of an embodiment of a shoe with interchangeable heel, with a detached low heel.

Figure 5 illustrates a side elevation of an embodiment of the modifiable shoe heel with an attached low heel.

Figure 6 illustrates a perspective view of an embodiment of the modifiable shoe heel with an attached low heel.

Figure 7 illustrates a side elevation of an embodiment of the modifiable shoe heel with an attached high heel.

Figure 8 illustrates a perspective view of an embodiment of the modifiable shoe heel with an attached high heel.

Figures 9-41 illustrate all the views of the modifiable shoe heel according to a particular embodiment.

DETAILED DESCRIPTION

[0008] According to one particular embodiment of the shoe with interchangeable heel 10, shown in figures 1-4, and without limitation, the fixed heel part 106 of the modifiable shoe heel 100 is bonded to the sole 102 with nails and adhesive in the customary manner employed with standard heeled shoes. An interchangeable heel part 108, 110 may then be removably attached to the fixed heel part 106, as shown in figures 2 and 4 in order to modify the height and style of the shoe with interchangeable heel 10. In this embodiment, the sole 102 is constructed of materials that permit flexing of the sole to provide proper foot position and support with both high and low heels. As a result, the heel of the shoe with interchangeable heel 10 can be adjusted quickly and easily for maximum comfort and elegance.

[0009] The fixed heel part 106, socket 126, insert 128, upper magnet 112, and lower magnet 114 of the embodiment shown in figures 1-8 are identical, however the height and style of the interchangeable heel parts 108, 110 vary. The overall height and style of the shoe with interchangeable heel 10 is determined by the design of the lower exposed portion of the interchangeable heel part 108, 110, and such designs can include unique heights, shapes, colors, textures, and so forth.

[0010] According to the embodiment of the fixed heel part 106 shown in figures 1-8, and without limitation, the fixed heel part 106 is composed of molded ABS plastic injected around the upper magnet 112. The top surface 124 of the fixed heel part 106 has a surface shape to match the shoe sole to which it is designed to attach. Socket wall surfaces will hereafter refer to both the upper wall surfaces 116 and lower wall surfaces 118 of the socket 126. The socket wall surfaces of the fixed heel part 106 are substantially conical or with the upper wall surfaces 116 converging gradually and the lower wall surfaces 118 converging markedly) to improve stability and attachability.

[0011] According to the embodiment of the interchangeable low heel part 110 shown in figures 3-6, the interchangeable low heel part 110 is composed of molded polyurethane plastic injected around the lower magnet 114. The shape of the insert 128 of the interchangeable low heel part 110 closely matches the shape of the socket 126 of the fixed heel part 106 in order to provide an exact fit of the insert 128 when fully inserted in the socket 126. When the interchangeable low heel part 110 is fully inserted, there is virtually no air gap between the lower magnet 114 and the upper magnet 112.

[0012] Insert wall surfaces will hereafter refer to both the upper wall surfaces 116 and lower wall surfaces 118 of the insert 128.

[0013] According to the embodiment of the interchangeable high heel part 108 shown in figures 1, 2, 7, 8, the interchangeable high heel part 108 is composed of molded ABS plastic injected around both the lower magnet 114 and the metal cylinder 120, capped by a

polyurethane heel base 122. The shape of the insert 128 of the interchangeable high heel part 108 closely matches the shape of the socket 126 of the fixed heel part 106 in order to provide a perfect fit of the insert 128 when fully inserted in the socket 126. When the interchangeable high heel part 108 is fully inserted, there is virtually no air gap between the lower magnet 114 and upper magnet 112. The metal cylinder 120 and heel base 122 are parts of the heel part 108.

[0014] Alternate embodiments of the fixed heel part 106, interchangeable low heel part 110, and interchangeable high heel part 108 are composed of any type of plastic, or any other strong and lightweight material suitable for use in the shoe with interchangeable heel 10. Alternate embodiments of the fixed heel part 106 permit other attachment methods to the sole 102 which achieve a secure and durable bond.

[0015] According to the embodiment of the shoe with interchangeable heel 10 shown in figures 1-4, the sole 102 is made of flexible leather to provide the requisite flexibility, and the shoe upper 104 primarily consists of a Lycra® and leather combination. The front flexible part of the insole is slightly longer than in a normal shoe in order to permit flexing of the sole 102 for adjustment to high and low heel heights.

[0016] Alternate embodiments of the sole 102 include a sole 102 made of flexible leather, rubber, a mixture of the foregoing materials, or any other suitable material. Alternative embodiments of the shoe upper 104 include a shoe upper 104 comprising leather, cloth, Lycra®, a mixture of the foregoing materials, or any other suitable material. In some shoe designs it is advantageous for the upper 104 to be constructed of a flexible material to facilitate proper foot position and support with both high and low heels.

[0017] According to the embodiment of the modifiable shoe heel 100 shown in figures 1-8, the upper magnet 112 and lower magnet 114 are neodymium magnets. The use of solid neodymium magnets permits a compact design with sufficient strength to securely attach the interchangeable heel part 108, 110 to the fixed heel part 106 during normal use of the shoe with interchangeable heel 10. An interchangeable heel part 108, 110 can simply be dropped into the fixed heel part 106 for instant attachment, and only a quick tug is required to detach the interchangeable heel part 108, 110 from the fixed heel part 106.

[0018] The simplicity of design of this magnetic attachment mechanism permits quick and easy replacement of the interchangeable heel part 108, 110 by a wearer of the shoe with interchangeable heel 10 without the need for manipulating additional locking mechanisms such as retractable pins. Furthermore, the simplicity of design considerably improves manufacturability of the modifiable shoe heel 100.

[0019] Alternate embodiments of the upper magnet 112 and lower magnet 114 include magnetic materials of any composition and shape that provide secure reten-

tion of the interchangeable heel part 108, 110 to the fixed heel part 106.

[0020] According to the embodiment of the modifiable shoe heel 100 shown in figures 1-8, the substantially conical shape of the socket wall surfaces and insert wall surfaces permits the insert 128 to be inserted into the socket 126 with negligible friction. Only upon full insertion of the insert 128 into the socket 126 is full contact established between the socket wall surfaces and insert wall surfaces. Furthermore, the gradual convergence of the upper wall surfaces 116 facilitates a deep socket 126 for better lateral retention of the insert 128, and the marked downward divergence of the lower wall surfaces 118 facilitates a wider and stronger insert 128 base. Consequently, the substantially conical shape of the insert 128 and socket 126 facilitates an easy fit of the interchangeable heel part 108, 110 to the fixed heel part 106, eliminates mechanical play once fully attached, and provides a sturdy interchangeable heel part 108, 110.

[0021] According to the embodiment of the modifiable shoe heel 100 shown in figures 1-8, the substantially square cross-section of the insert 128 and socket 126 prevents rotation of an interchangeable heel part 108, 110 relative to the fixed heel part 106. This avoids the need for notch and key guides, which detract from simplicity of design and complicate the manufacturing process.

[0022] Alternate embodiments of the insert 128 and socket 126 include inserts 128 and sockets 126 with any cross sectional design that prevents rotation of the interchangeable heel part 108, 110 relative to the fixed heel part 106.

[0023] According to the embodiment of the modifiable shoe heel 100 shown in figures 1-8, the ability to create highly accurate molds for the fixed heel part 106 and interchangeable heel part 108, 110 permits an almost undetectable surface join between the attached parts, and eliminates mechanical play of the attached interchangeable heel part 108, 110. In this way, a stable shoe with interchangeable heel 10 is achieved without sacrificing aesthetics.

[0024] Alternate embodiments of the insert 128 and socket 126 include socket wall surfaces and insert wall surfaces of different conical designs, including substantially conical designs which are not entirely conical, that minimize friction between the socket wall surfaces and insert wall surfaces during insertion and removal of the interchangeable heel part 108, 110.

[0025] According to the embodiment of the modifiable shoe heel 100 shown in figures 1-8, the fixed heel part 106, which houses the female socket 126 in this gender orientation, is able to attach to the sole 102 over the same area as a standard heeled shoe. The region of maximum stress on a shoe is at the join of the heel with the sole, and the wider the area of attachment the greater the join strength. In addition, the naturally upward flaring of a shoe heel more effectively accommodates a deep socket 126 thereby providing greater support of the interchange-

able heel part 108, 110. Furthermore, by housing the socket 126 in the fixed heel part 106, a rapid downward tapering of the modifiable shoe heel 100 is possible, thereby permitting narrower and more elegant designs for the modifiable shoe heel 100 that rival the aesthetics of standard heeled shoe designs. Moreover, the interchangeable heel part 108, 110, which includes the male insert 128 in this gender orientation, has a narrow form impossible to achieve with a reversed gender orientation. Consequently, the portability of alternate interchangeable heel parts 108, 110 is significantly enhanced, such that interchangeable heel parts 108, 110 can easily be carried in a purse or small bag.

[0026] While particular embodiments have been described, it is understood that, after learning the teachings contained in this disclosure, modifications and generalizations will be apparent to those skilled in the art without departing from the spirit of the disclosed embodiments. It is noted that the foregoing embodiments and examples have been provided merely for the purpose of explanation and are in no way to be construed as limiting. While the article of manufacture and methods have been described with reference to various embodiments, it is understood that the words which have been used herein are words of description and illustration, rather than words of limitation. Further, although the invention has been described herein with reference to particular means, materials and embodiments, the actual embodiments are not intended to be limited to the particulars disclosed herein; rather, the system extends to all functionally equivalent structures, methods and uses, such as are within the scope of the appended claims. Those skilled in the art, having the benefit of the teachings of this specification, may effect numerous modifications thereto and changes may be made without departing from the scope and spirit of the disclosed embodiments in its aspects.

Claims

1. A modifiable shoe heel comprising:

a) a fixed heel part adapted on one end for attachment to a shoe sole and on the other end for removable magnetic attachment to an interchangeable heel part; and b) an interchangeable heel part adapted on one end for removable magnetic attachment to said fixed heel part and on the other end for contact with the ground, whereby the height and style of the heel of a shoe may be adjusted by attachment of the desired interchangeable heel part to said fixed heel part of said shoe.

2. The modifiable shoe heel of claim 1, wherein said fixed heel part comprises a socket and a first magnetic material, and said interchangeable heel part

comprises an insert and a second magnetic material, said insert is shaped to fill said socket, and said first and second magnetic materials exhibit magnetic attraction when in mutual proximity.

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3. The modifiable shoe heel of claim 2, wherein said interchangeable heel part is retained in said fixed heel part solely by both lateral support of said socket wall surfaces and mutual attraction of said first and second magnetic materials. 10
4. The modifiable shoe heel of claim 3, wherein said socket upper wall surfaces converge gradually, and corresponding lower wall surfaces converge markedly to 1) enable full insertion of said insert into said socket with negligible friction, 2) establish full contact between said socket wall surfaces and said insert wall surfaces only upon full insertion, 3) facilitate a deep socket for improved lateral retention of the insert, and 4) facilitate a wider and stronger insert base due to the marked downward divergence of said socket lower wall surfaces. 15 20
5. The modifiable shoe heel of claim 4, wherein said socket and insert wall surfaces are substantially conical with a non-circular cross-section to prevent rotation of said interchangeable heel part. 25
6. The modifiable shoe heel of claim 5, wherein said cross-section is substantially squared to prevent rotation of said interchangeable heel part. 30
7. The modifiable shoe heel of claim 6, wherein at least one of said first and second magnetic materials are neodymium magnets. 35
8. The modifiable shoe heel of claim 7, wherein said fixed heel part connects to a flexible sole permitting flexing of the sole for adjustment to high and low heel heights. 40
9. The modifiable shoe heel of claim 8, wherein said socket is at least two centimeters in depth in said fixed heel part, and said socket can securely retain an interchangeable low heel part and an interchangeable high heel part. 45
10. The modifiable shoe heel of claim 9, wherein said fixed heel part is composed of molded ABS plastic injected around said first magnetic material. 50
11. The modifiable shoe heel of claim 10, wherein said interchangeable heel part is composed of molded polyurethane plastic injected around said second magnetic material. 55

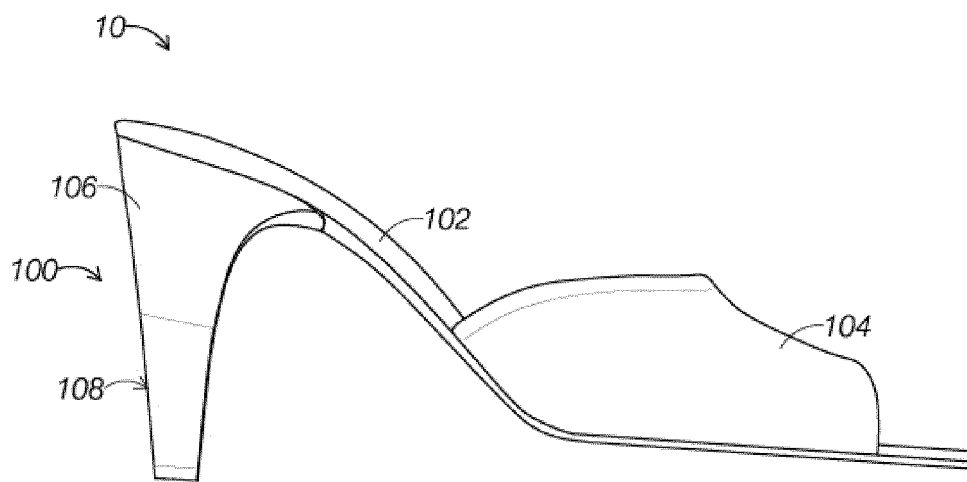


FIG.1

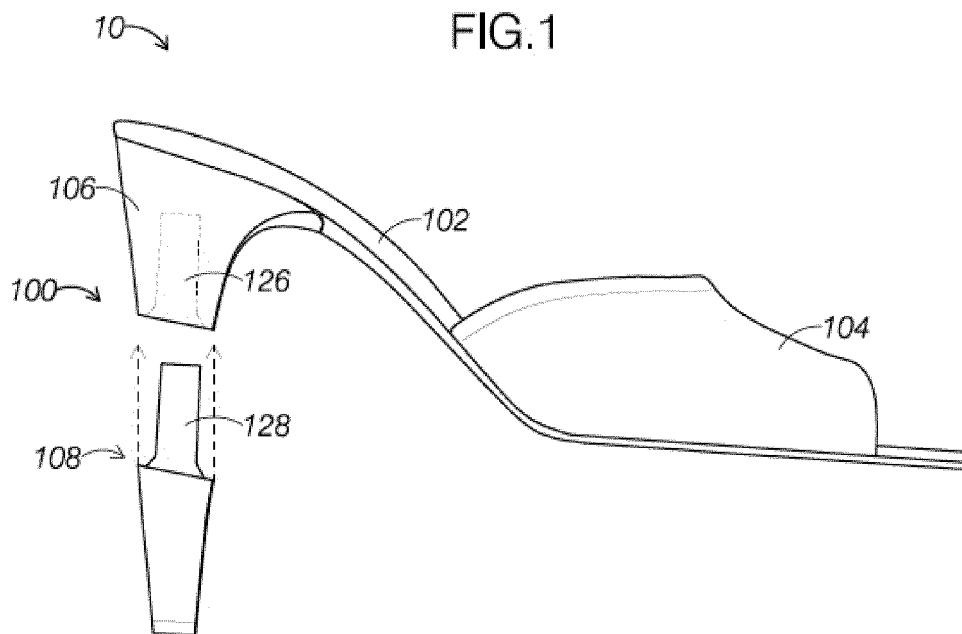


FIG.2

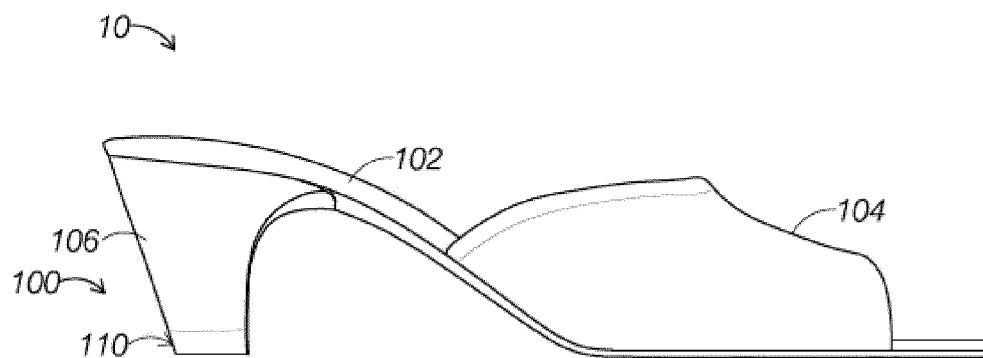


FIG.3

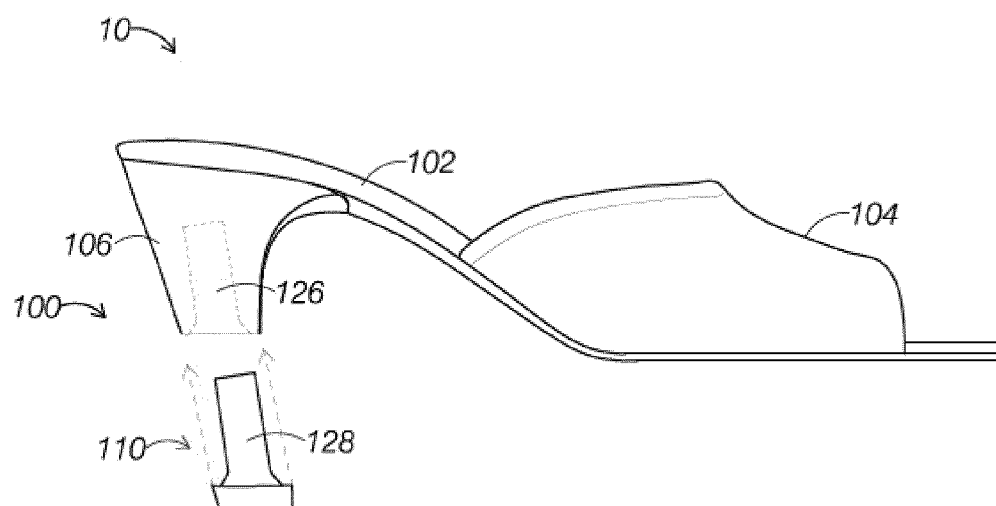


FIG.4

100

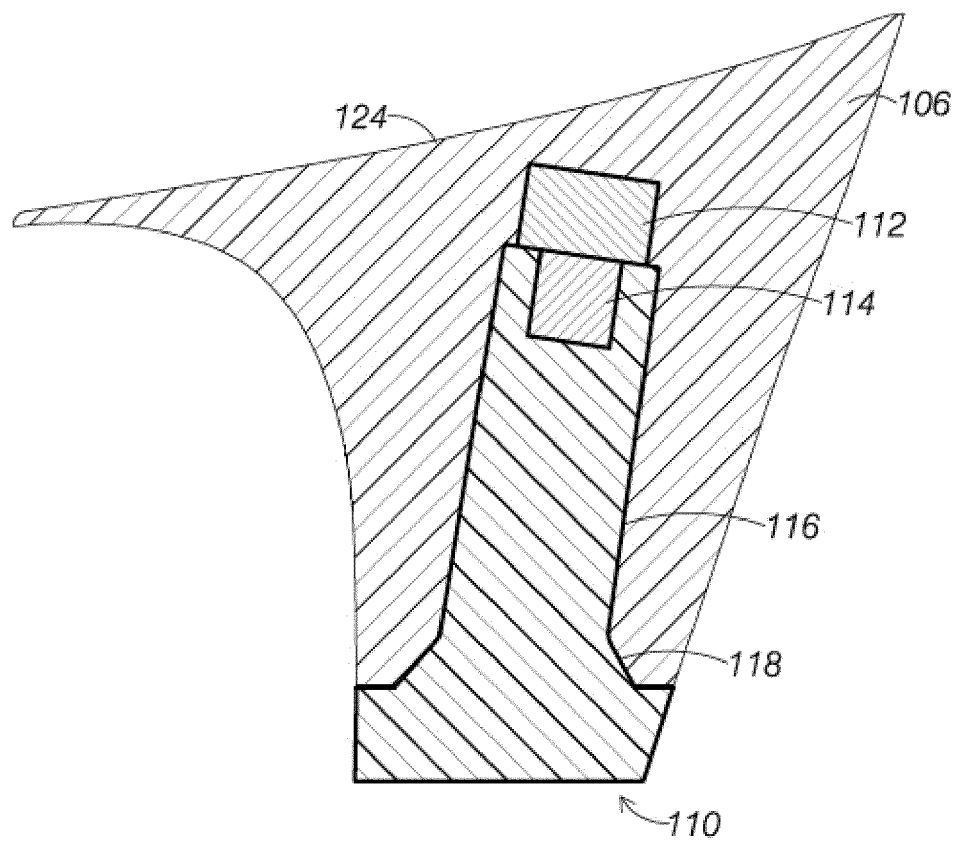


FIG.5

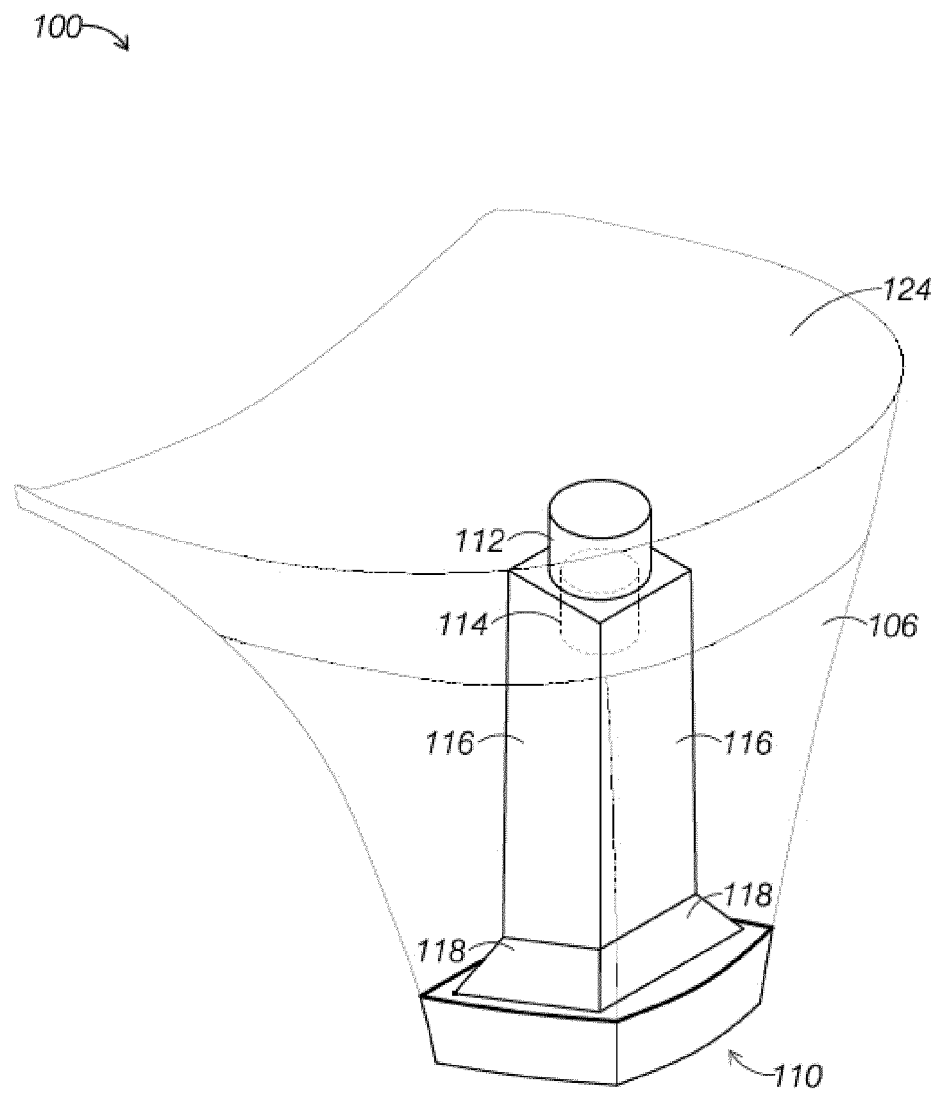


FIG.6

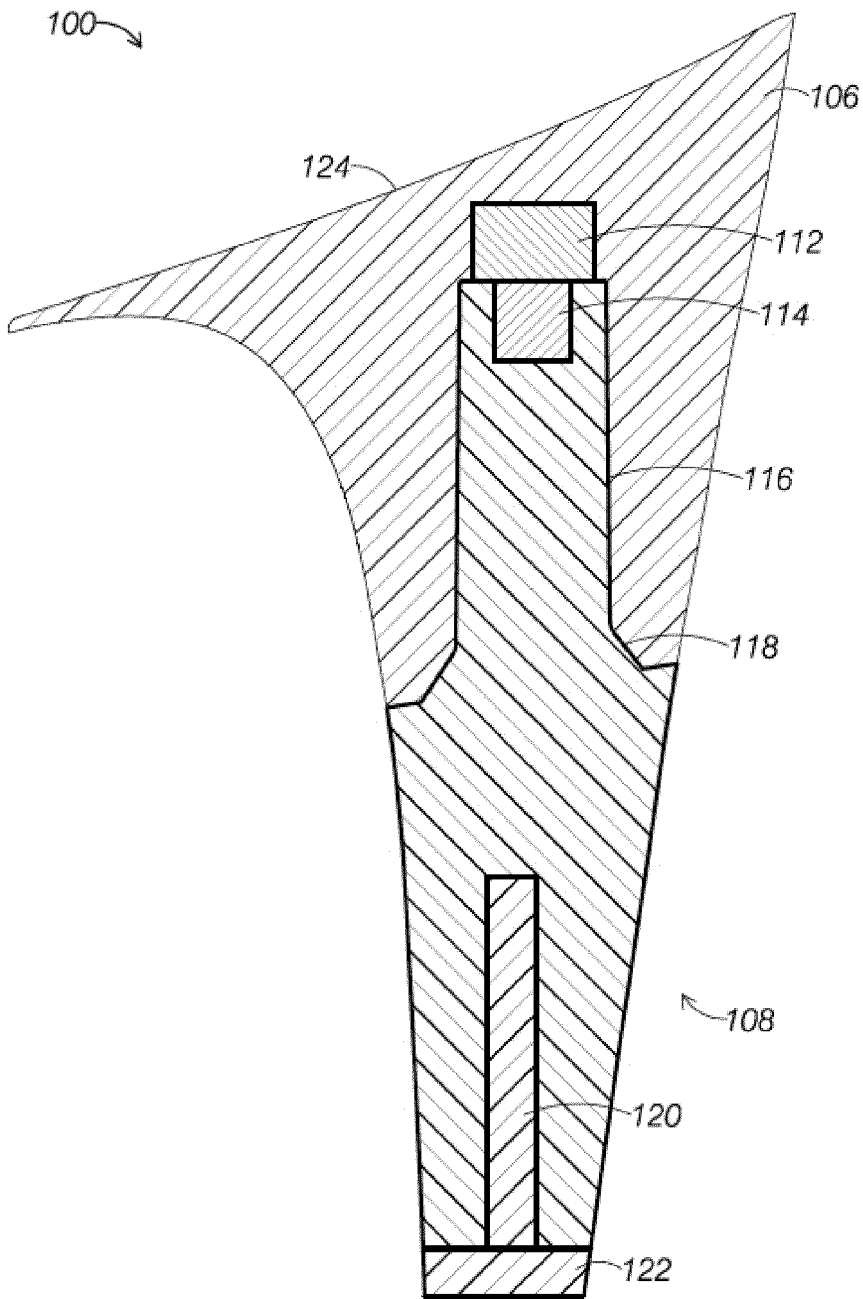


FIG.7

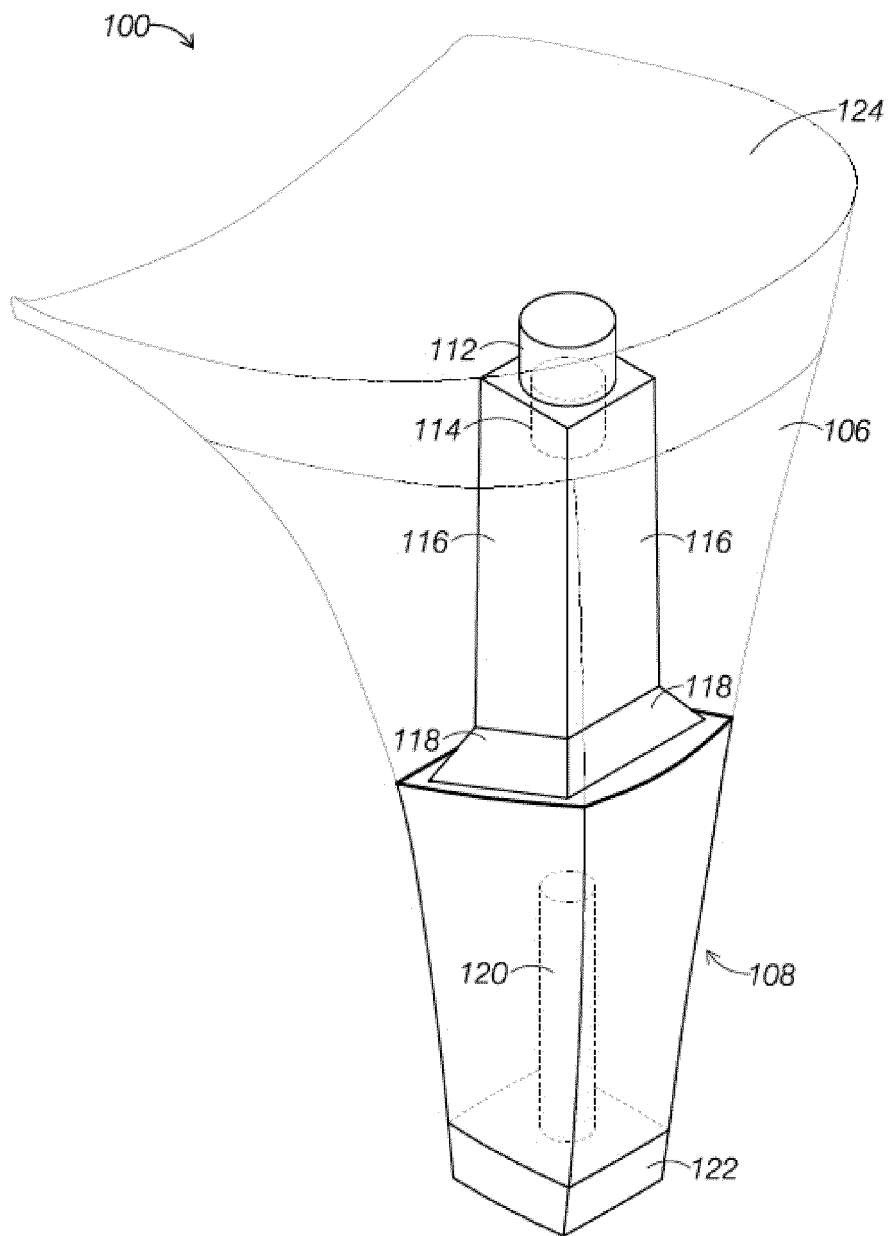


FIG.8

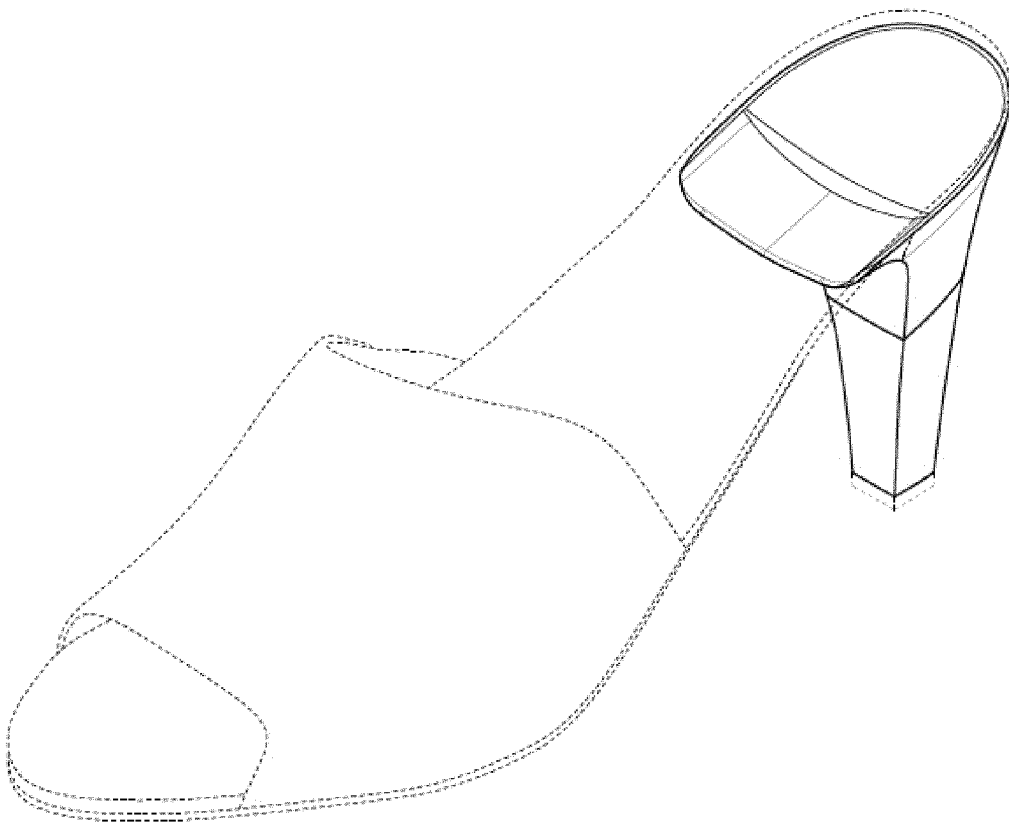


FIG.9

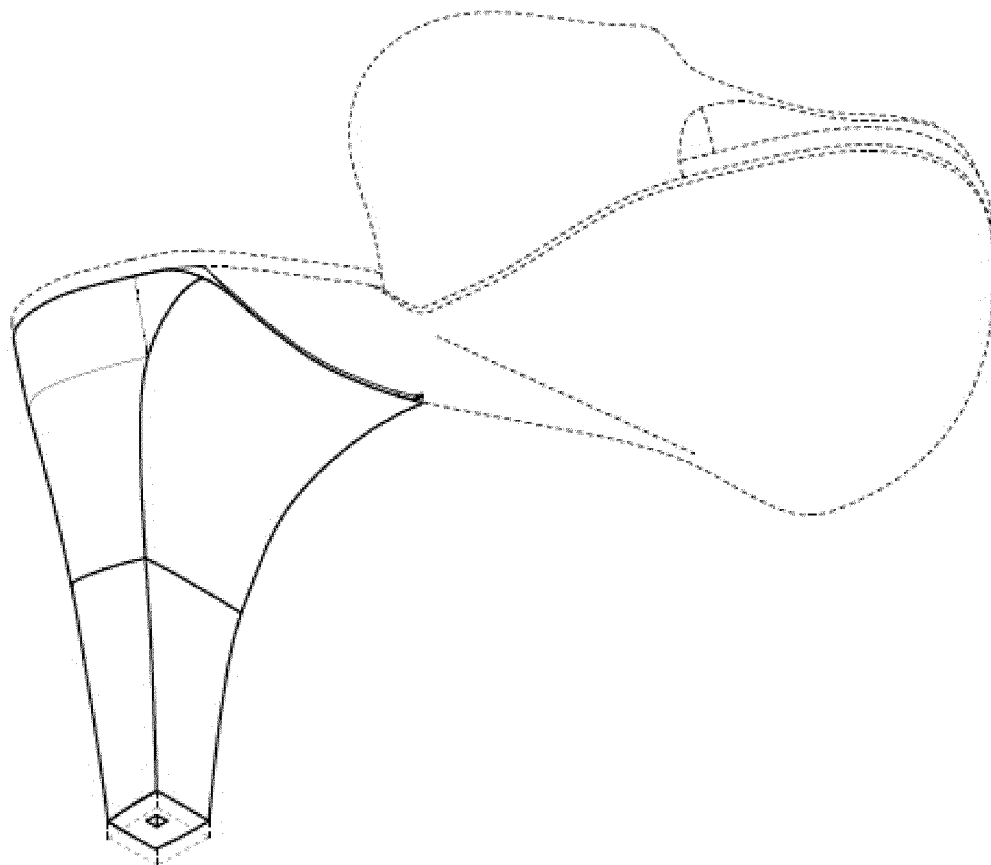


FIG.10

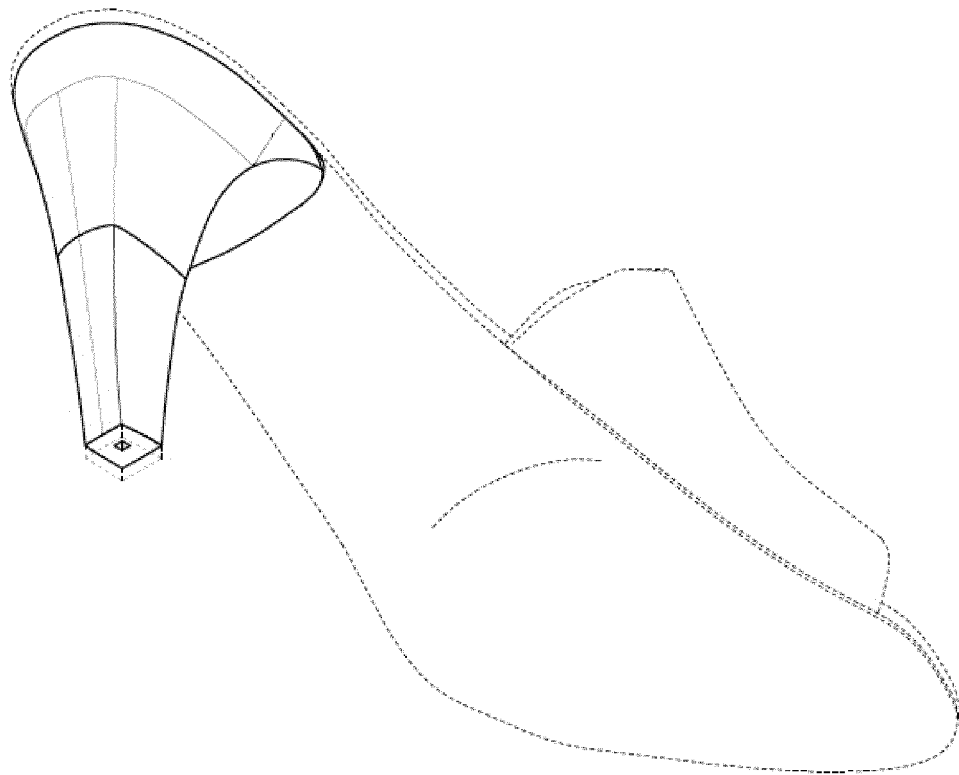


FIG.11

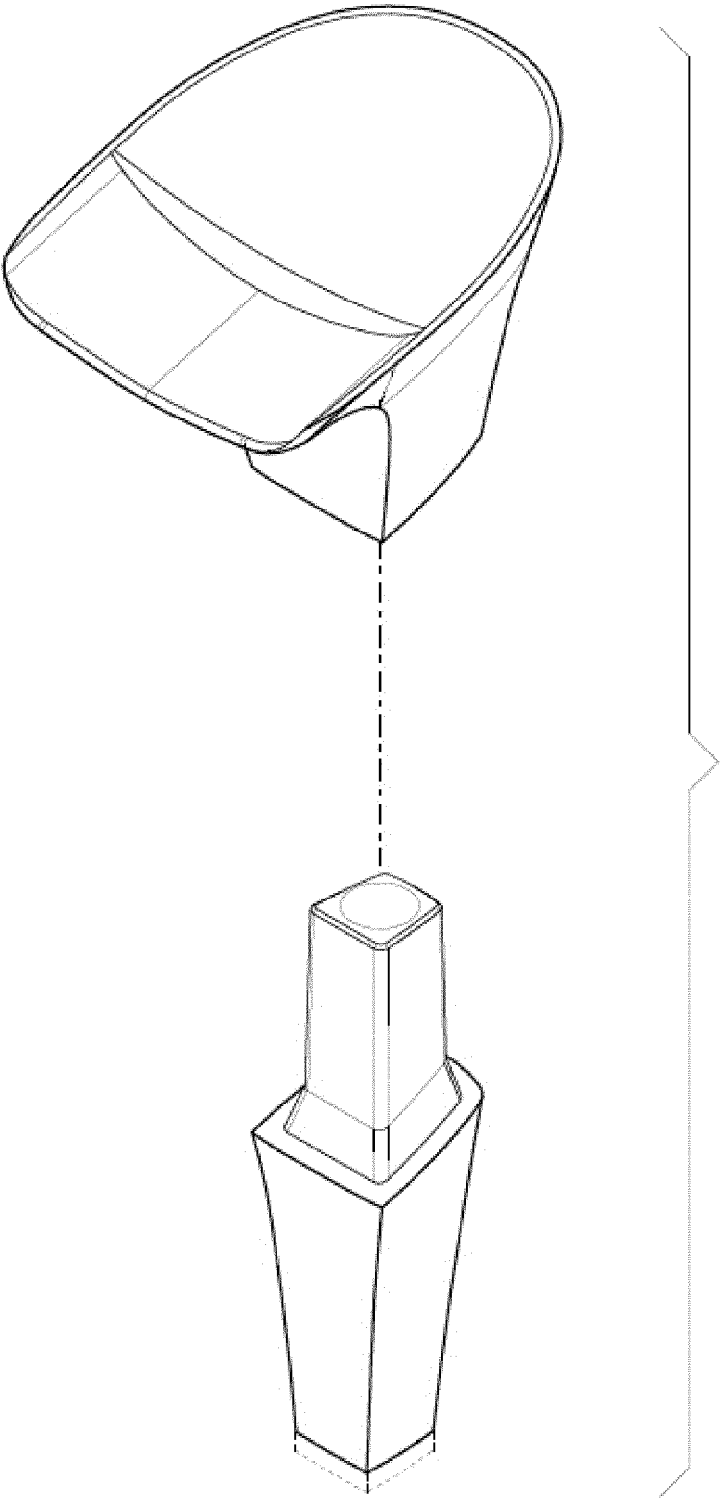


FIG. 12

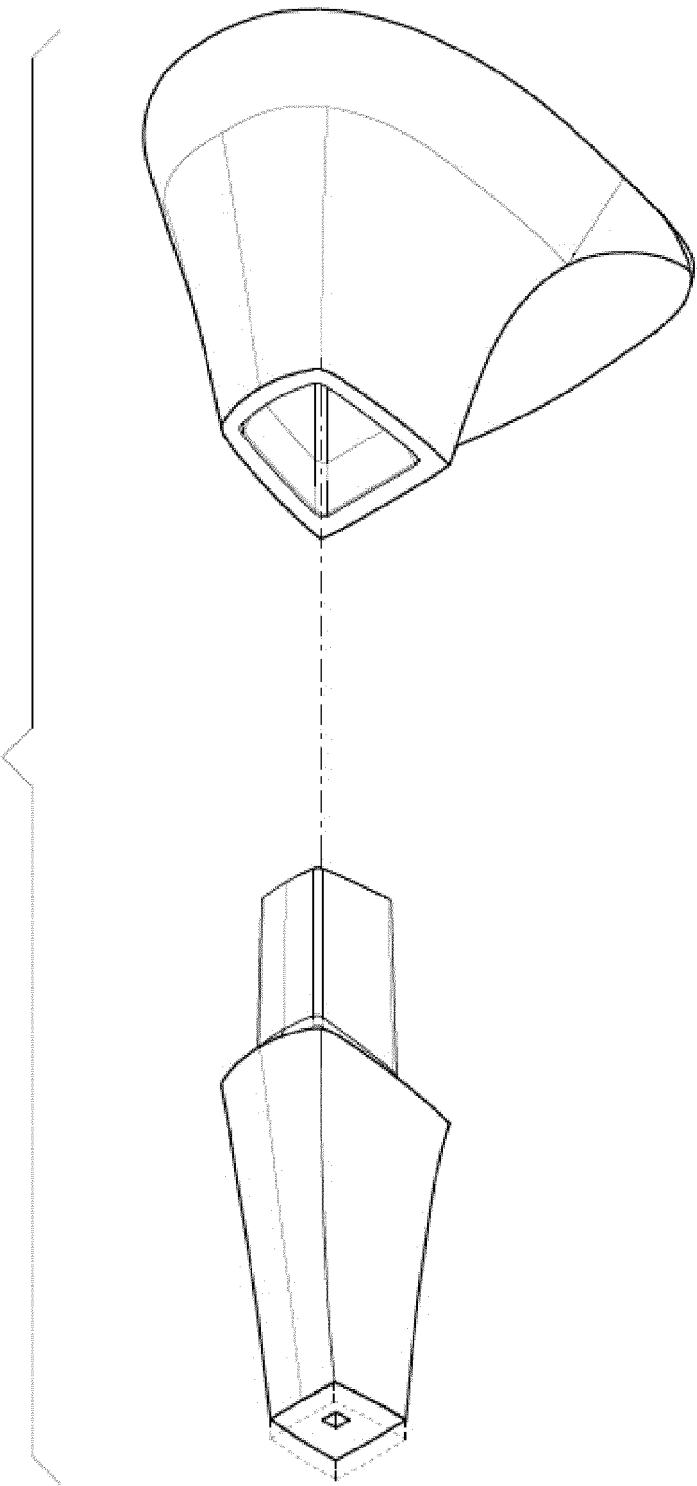


FIG.13

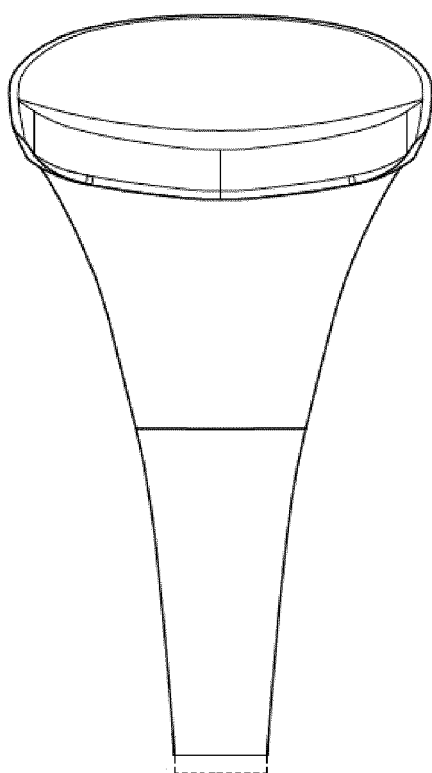


FIG.14

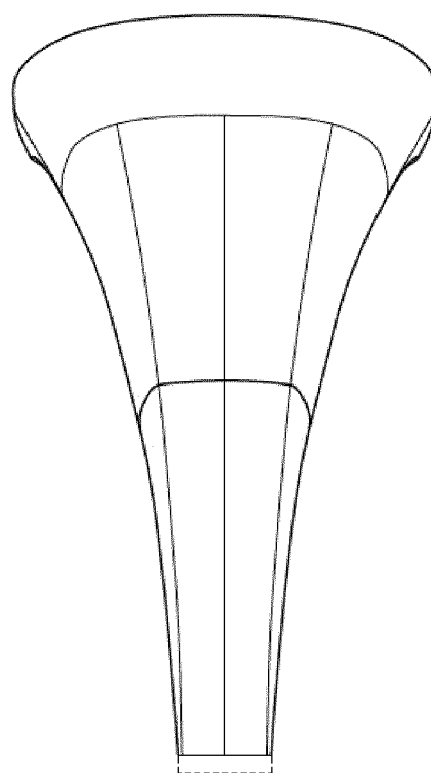


FIG.15

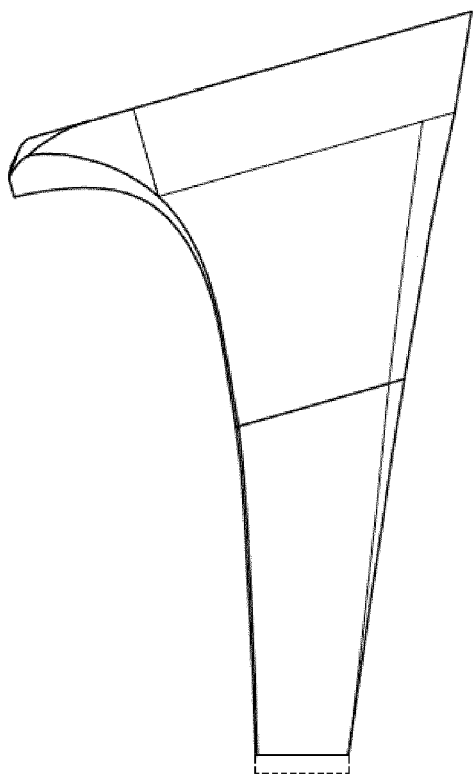


FIG. 16

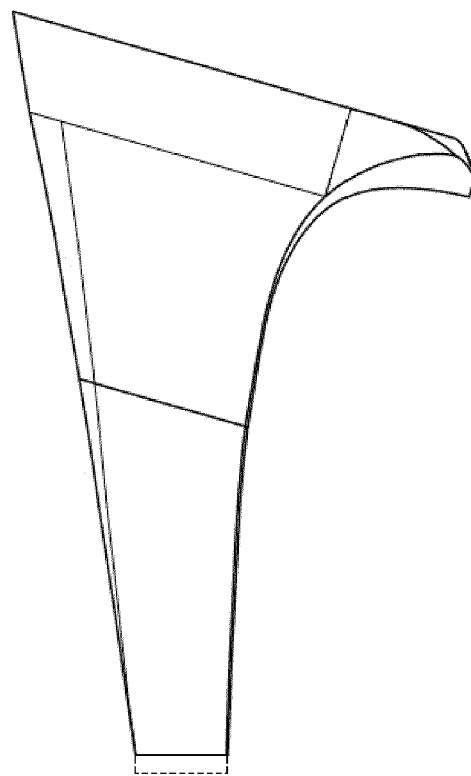


FIG. 17

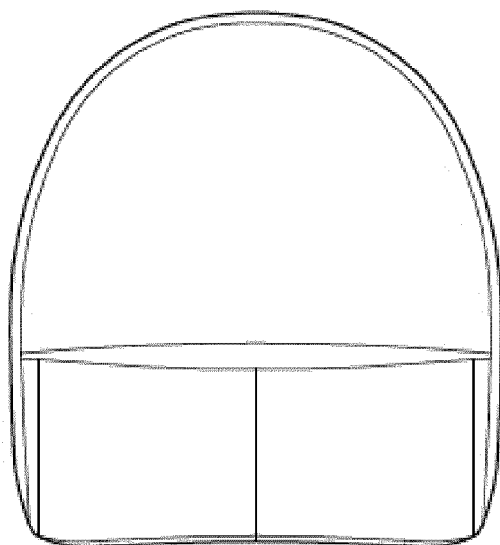


FIG. 18

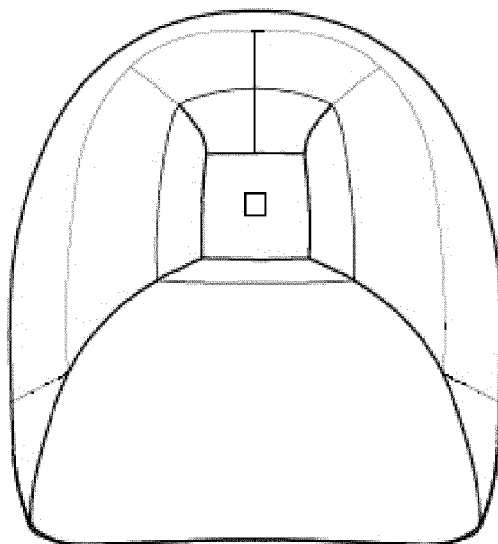


FIG. 19

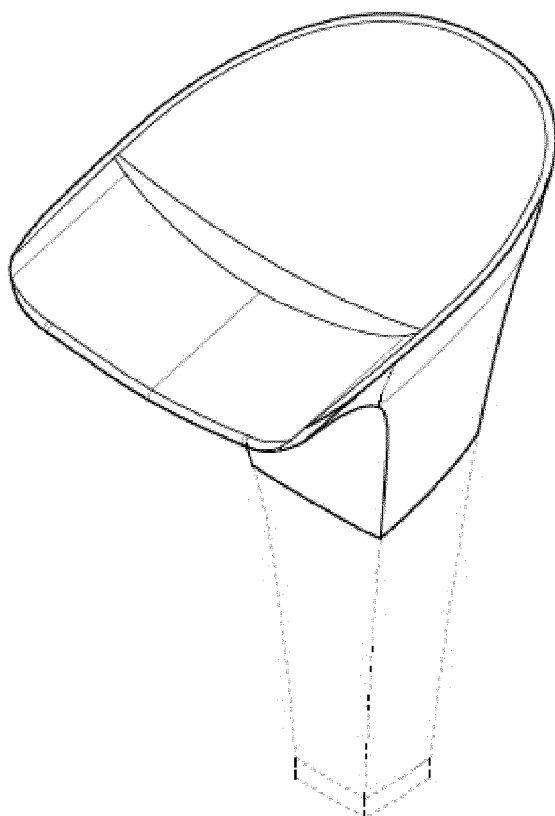


FIG. 20

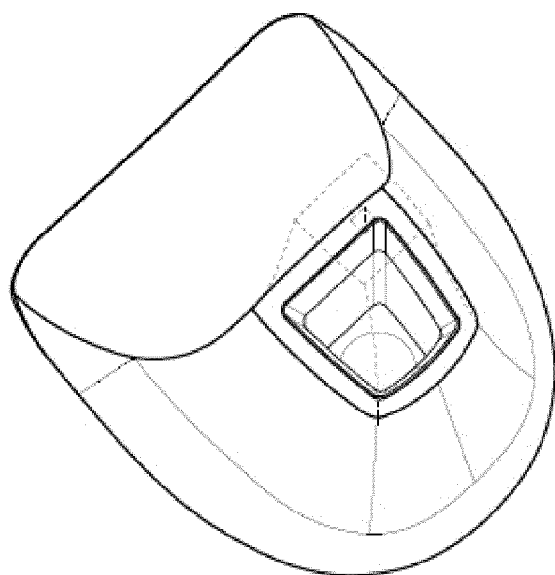


FIG. 21

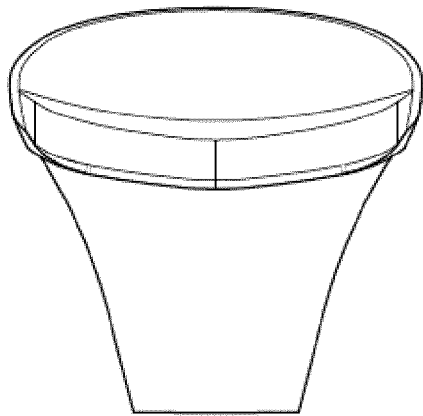


FIG.22

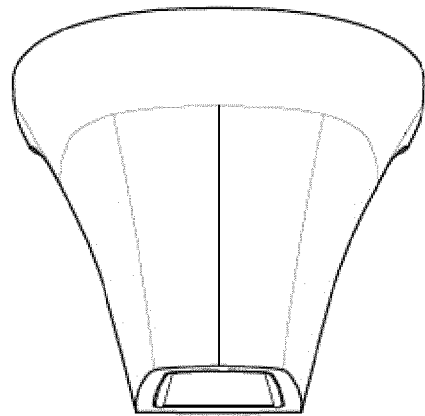


FIG.23

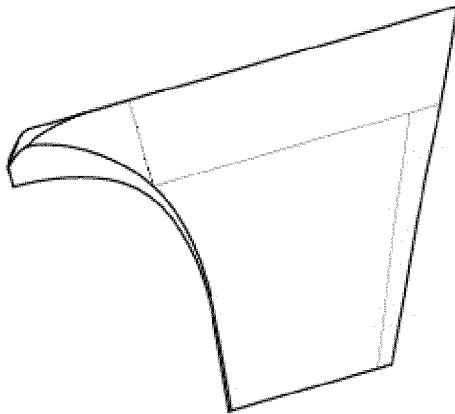


FIG.24

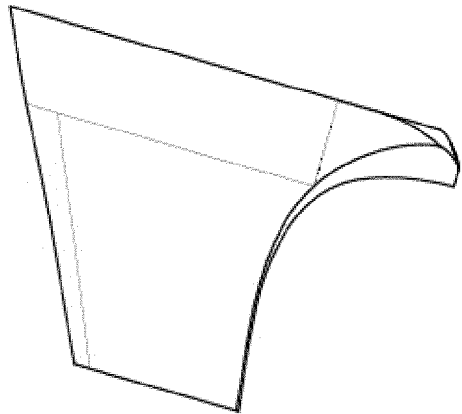


FIG.25

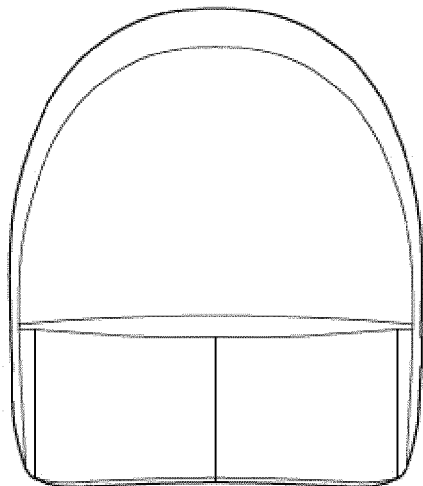


FIG.26

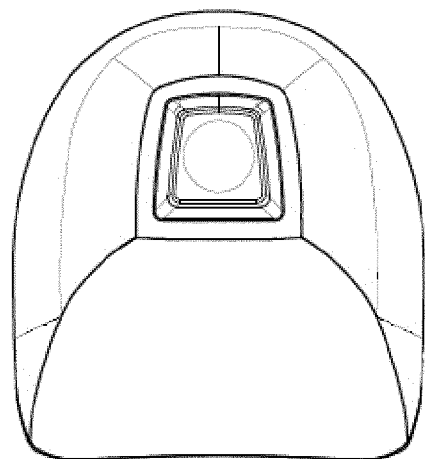


FIG.27

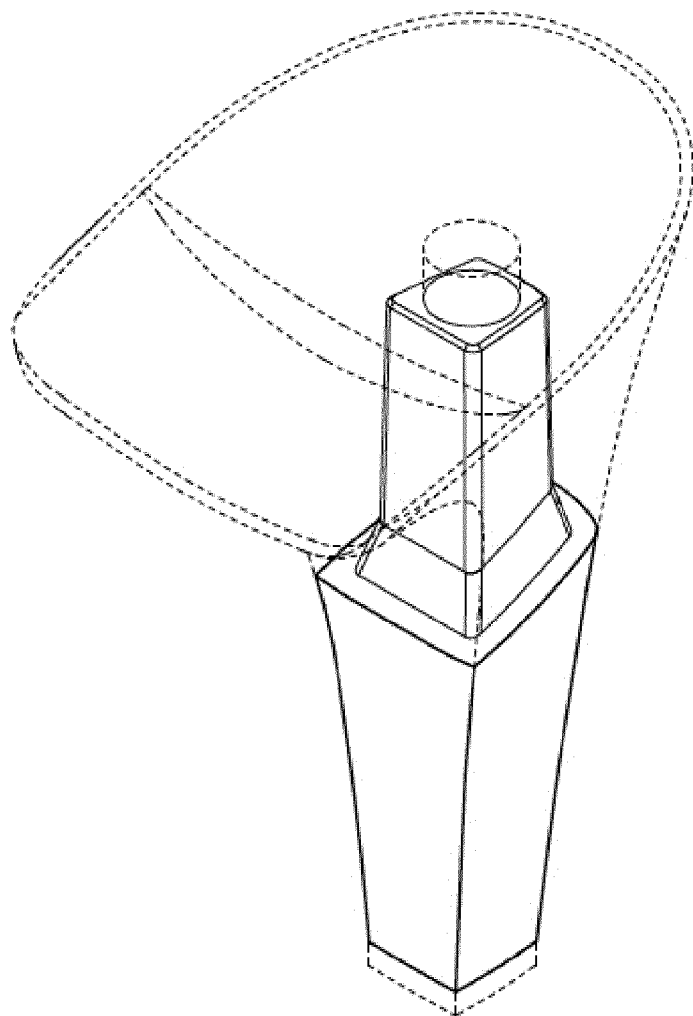


FIG.28

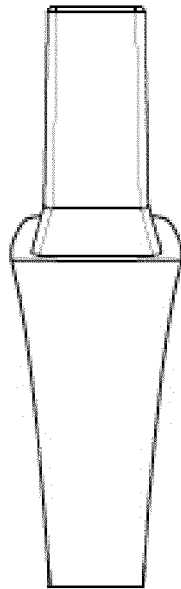


FIG. 29

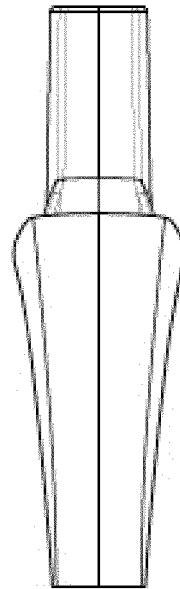


FIG. 30

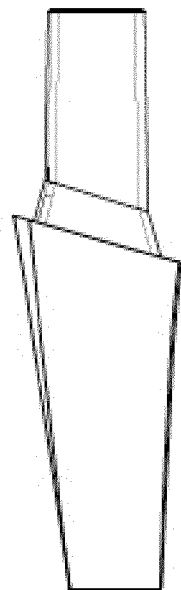


FIG. 31

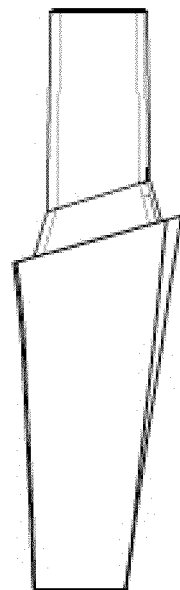


FIG. 32

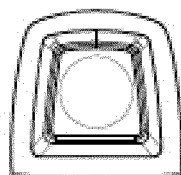


FIG. 33

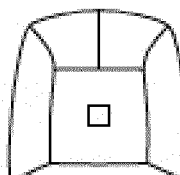


FIG. 34

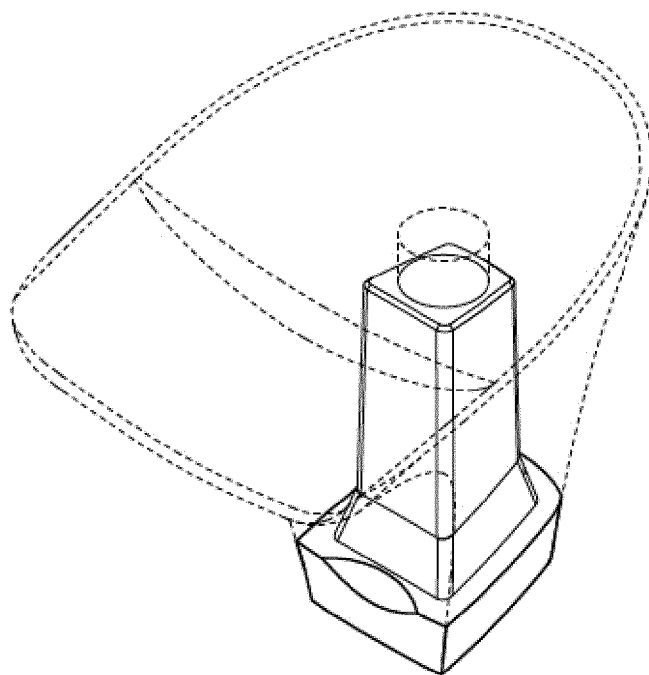


FIG.35

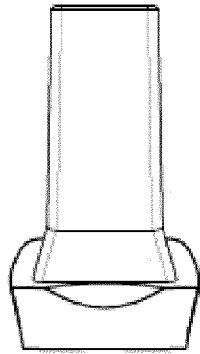


FIG.36

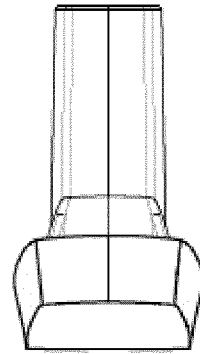


FIG.37

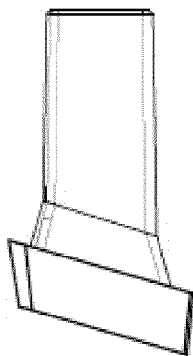


FIG.38

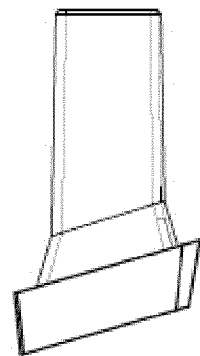


FIG.39

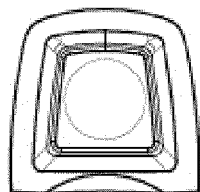


FIG.40

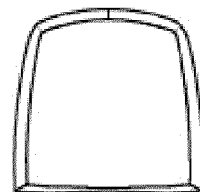


FIG.41



EUROPEAN SEARCH REPORT

Application Number
EP 11 19 6221

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 11 10 049 B (KAYE CREDIT CORP OF TEXAS) 29 June 1961 (1961-06-29) * column 1 - column 3, line 2; figures 1-8 *	1-11	INV. A43B21/42 A43B1/00
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