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(54) High heel shoe and shank for high heel shoe

(57) The high heel shoe (10) comprises a sole assembly (30), a shank (15), a high heel (20), wherein the shank comprises a first end, a narrow intermediate portion and a second end provided with two spaced support surfaces, the shank's first end being enlarged relative to the intermediate portion and in contact with a high heel's wider portion (20a). At least two laterally spaced fixation devices (21, 210) are provided to fix the shank (15) to the high heel.

With such a configuration, the shank (15) is better fixed to the heel and its weight is optimized. Furthermore, the spaced support surfaces in the shank forepart increase lateral stability for the user's foot. Such support surfaces may be formed in respective segments of a fork. The respective fork ends are preferably placed in an appropriate manner, adjacent to metatarsal heads, to form with the heel a triangle for supporting the foot.

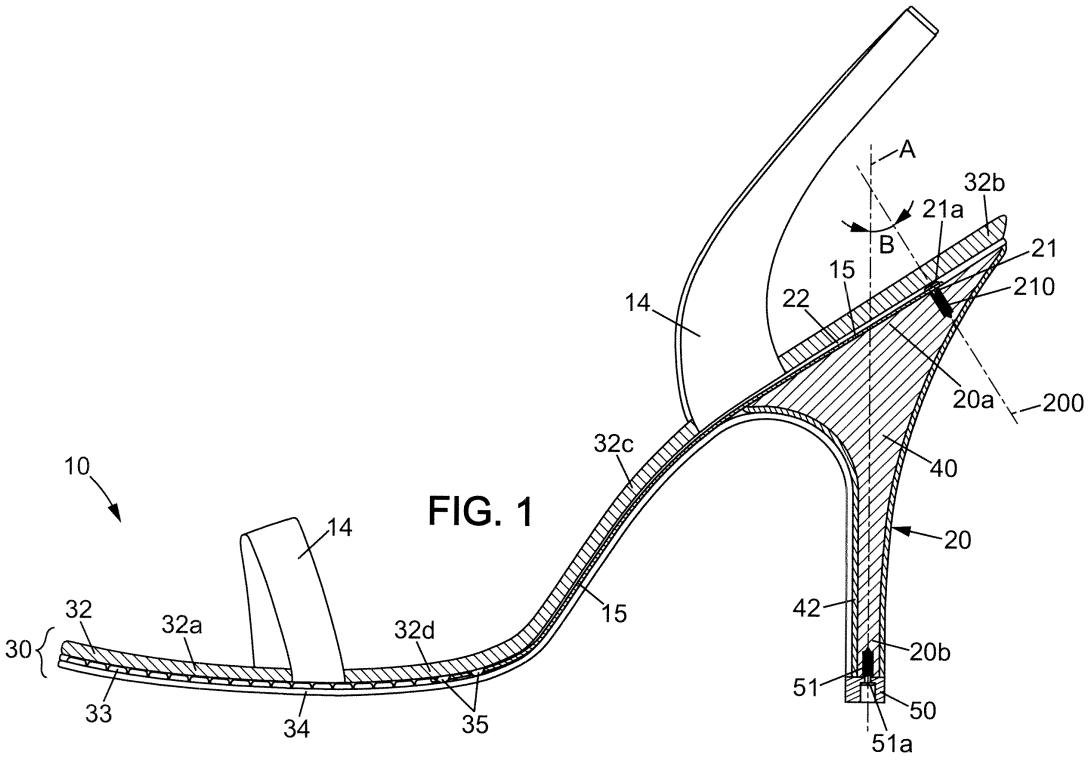

FIG. 1

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to high heel footwear and more particularly to women's high heel shoes having a stiletto heel.

BACKGROUND OF THE INVENTION

[0002] An increasing number of women shoes and boots comprise a stiletto heel, which has a wider portion atop at the heel seat level and is narrower at its tip, as it reaches the ground. A stiletto heel typically has a diameter at ground-level of less than 1 cm (about 0.4 inch). Stiletto heels enable to create height. For instance, stiletto heels may vary in height from 2.5 cm (about 1 inch) up to 14 cm (about 5.5 inches). It is generally accepted in the medical world that a 4.5 cm heel (about 1,8 inches) is the recommended height for the well-being and comfort of users.

[0003] The main structure of a high heel shoe is typically made of the following components:

- Thermoplastic resin heel (with or without a metal rod inside);
- Thermoplastic resin heel lift;
- Steel/fibreboard/cork shank;
- Leather/rubber insole;
- Leather/rubber outer sole;
- Polyurethane foam out sole;
- Counter, collar, tip and straps of various materials.

[0004] As depicted in Figure 3 of document US 4272897, a metallic shank of sufficient length generally extends from the heel area to approximately the beginning of the ball of the foot. Fixation and support of such shank is enabled trough a heel post or rod that is threaded and extends the length of the heel, with its lower end extending beyond the bottom of the heel for the fastening of a top lift thereto.

[0005] Stability and resistance of such high heel shoes is improved when such a post is provided. However this solution is far from break proof and unsatisfactory for end consumers. The higher and thinner the heel, the more brittle it is. Polyurethane, polyethylene and polyamide resin, in their solid forms, are all high conductors of vibrations and by using such material for heels, it may cause the wearer foot pains, injuries, leg strains and backaches. When the heel lift of the stiletto impacts the ground, it creates a strong shock because all of the user's weight is forced onto a very small surface at great speed. This occurs every time a step is taken and challenges the heel's resistance. The vibrations resulting from this shock travel from the heel tip through the heel, to the foot, then along the leg, and onto the back. With extensive use, it thus can cause serious back damage such as arthritis and lordosis.

[0006] Moreover, the shank is relatively narrow and problems of lateral stability may be encountered.

[0007] Document GB 888605 discloses a shank having an arched shape to be fixed in two opposite points. Such two-point fixture does not efficiently prevent loosening of the shank. The shank is made of interconnected parts to allow the foot to move freely in the manner which nature intended, in particular, in a wringing movement. Such kind of shank is complex and has a thick shape that is aesthetically inappropriate in the fashion industry.

[0008] The heel of women's high heel shoes can also be made of wood. It is less resistant than resin but more comfortable because it is lighter and more shock absorbent. However, its production is slow, handmade and costly.

[0009] Therefore, a great need exists for high heel shoes of simple, lighter construction, with greater breakage resistance, very strong fixture devices, more comfort and with medical benefits such as shock and vibration absorption, without affecting the aesthetic qualities of stiletto heels, primarily given by their thinness.

SUMMARY OF THE PRESENT INVENTION

[0010] Embodiments of the present invention provide a high heel shoe comprising a sole assembly, a shank, a high heel, at least one fixture device to fix the shank to the high heel, the high heel featuring a wider portion and a thinner portion, **characterized in that** the shank extends along a longitudinal direction and comprises a first end, a narrow intermediate portion and a second end providing two spaced support surfaces (these two support surfaces may be distant from each other along a lateral direction extending crosswise relative to said longitudinal direction), the shank's first end being enlarged relative to the intermediate portion and in contact with the high heel's wider portion (named heel seat), and such fixture device of said shank to said heel's wider portion comprises two spaced fixture devices.

[0011] By virtue of this arrangement, the shank has a strong two-point fixture to the heel and the length of screw joints or similar inserts into the heel may be efficiently decreased for a better prevention of vibration conduction during the walking. Moreover, the two support surfaces of the second end increase stability of the shank and provide a better support for the user. Adaptability of the shank is also obtained for various sizes and widths of high heel shoes because location of the two inserts into the heel may vary.

[0012] According to another feature, the fixture devices are distant from the high heel's thinner portion. Advantageously, the thinner portion of the heel highly is lighter, more homogeneous and a lesser conductor of vibrations.

[0013] According to another feature, the enlarged first end of the shank presents at least two apertures that are laterally spaced from each other, each traversed by one screw. With such an arrangement, lateral stability at the

main inflexion point of the foot (external foot arch) is thus improved during the walking because of the specific shape of the shank and the two-point fixture.

[0014] According to another feature, each of said fixation devices comprises:

- at least one first retaining element engaged with said enlarged first end;
- at least one second retaining element engaged with the high heel's wider portion;
- a linking element integral with at least one of said first and second retaining elements, traversing said enlarged first end.

[0015] According to another feature, the portion of the shank between its first end and the beginning of the fork's shape of said shank may be arched laterally outwards, thus providing significant improvements for the lateral stability of the wearer's foot and far greater support for the user's external foot arch.

[0016] According to another feature, the shank second end comprises a fork with lateral extension wider than lateral extension of said first enlarged end. With such a shape, the overall stability of said high heel shoe is improved, the weight distribution of all the foot's pressure points onto said high heel shoe is optimized and the breakage resistance of said shank as well as of the fixture of said shank to said high heel is increased significantly.

[0017] According to another feature, the shank's second end comprises a fork with two segments, said shoe being either suitable for a left foot with said fork orientated to the right side of the shoe, or suitable for a right foot with said fork orientated to the left side of the shoe. The shank may be Y-shaped. Advantageously, such a fork improves comfort due to efficient support of metatarsal heads, thus preventing some foot pathologies. The forked area of said shank may be filled in-between for the purpose of ease in its manufacturing process, yet retaining all its advantageous properties. Segments of the fork are preferably arched to fit the foot arch's curvature.

[0018] According to another feature, the shank comprises a metallic piece, preferably aluminium, or at least one layer of plastic material, wrapped or coiled around with tinctured carbon fiber twill weighing 50-500g/m^2 and preferably 100-300g/m^2, said metallic piece having a thickness lower than 0,3 mm. With such an arrangement, the shank is practically invisible, particularly light, and benefits from great breakage resistance. The shank may be sufficiently thin to be lighter that 10 g.

[0019] According to another feature, the second end comprises two laterally spaced holes, the sole assembly comprising two cushioning elements respectively received in said holes or one cushioning element fixed in said holes. By virtue of another arrangement, one cushioning element is placed over and across the fork ends of such shank and maintained in place by protruding shapes that fit exactly into said holes: the entire metatarsal area of the foot's frontal part is thus supported. The comfort for the user is therefore advantageously improved.

[0020] According to another feature, said fixation devices comprise screws shorter than 30mm, preferably shorter than 18mm. Thus, vibrations are less likely to be transmitted from the bottom of the high heel to the user's foot. Furthermore, the insertion axe of the screws may be inclined and location of the screws may easily vary according to size of the shoe.

[0021] According to another feature, said second retaining element is a tubular thread insert based on carbon, having external ribs for engagement in a cavity of the high heel's enlarged portion. Advantageously, the use of several weight threaded inserts increase resistance of the fixture and avoids shank collapsing (thus preventing foot sprain or ankle breaking).

[0022] One object of the present invention is also to provide a kit of high heel shoes having common pieces for a variety of sizes.

[0023] Accordingly, it is further proposed, according to the invention, an assembly of high heel shoes comprising a first size shoe and a second size shoe, each having a high heel, a shank, and a sole assembly, and all chosen in the same category amongst the left shoes category and the right shoes category, the shank comprising a first end, an intermediate portion and a second end, the high heel comprising a wider portion and a thinner portion, said second size being higher than said first size, **characterized in that** the shank of the first size shoe is identical to the shank of the second size shoe. Said shank also comprises a first end that is enlarged relative to the intermediate portion and in contact with the high heel, at least two spaced fixture devices for fixing the shank's first end to the high heel being provided and engaging the high heel's wider portion, said second end providing two spaced support surfaces.

[0024] Advantageously, the shank remains the same for all right shoes or all left shoes of different sizes and the shank's two-point fixture to the heel's wider portion is particularly resistant. Cost savings are thus obtained for production of such a shank.

[0025] Other features and advantages of the invention will become apparent to those skilled in the art with the description that follows, given by way of a non-limiting example, with reference to the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026]

FIG. 1 is a side cut view of a high heel shoe according to a preferred embodiment of the invention;

FIG. 2A is a top cut view down to the out sole showing the shank of the high heel shoe of Fig. 1;

FIG. 2B is a top view of a shank suitable for a left

shoe;

FIG. 3 and 4 are respective side cut views of a high heel shoe model such as in Fig. 1, differing in size;

FIG. 5 and 6 are respective top cut views down to the out sole of the respective shoes of FIG. 3 and Fig. 4.

DETAILED DESCRIPTION OF THE INVENTION

[0027] In the various figures, the same references are used to designate identical or similar elements.

[0028] As shown in figures 1 and 2, the shoe 10 is a sling-back sandal which essentially includes straps 14, a shank 15 (also called shank-stiffener), a high heel 20 and a sole assembly 30. Other types of shoes may include an upper covering the toe region (not shown) and a counter to support the heel of the wearer's foot (not shown). The sole assembly 30 comprises an outsole 32, an inside sole 33, and an outer sole 34. In a conventional manner, the outsole 32 is configured with the foot-shape profile of the shoe, with a toe end 32a, a heel end 32b, an arch profile 32c corresponding to the natural curvature of the foot's arch, and a forepart 32d established between the toe end 32a and the arch profile 32c. Shock absorbers 35 may be placed between (and through) the shank 15 and the inner sole 33, under the forepart 32d of the outsole 32.

[0029] The shoe 10 is provided with generally conventional or convenient construction for the type of shoe desired, such as an open upper for the sandal-type shown, with one or more straps 14 for securing the shoe to the wearer's foot. The shoe 10 can be provided in any style desired, including but not limited to, an upper (not shown) for a partially or substantially closed high heel shoe, or an upper for either a low or a high heel boot. The upper (not shown) is made from any suitable material to obtain any desired fashion or appearance of the shoe. The outer sole 34 is typically made from leather, imitation leather, resilient plastic or rubber material, but can be made from any other material suitable for outsoles.

[0030] The sole assembly 30, counters, collars, tips and straps 14 of the shoe 10 will not be described in detail since they do not concern the present invention.

[0031] With reference to figures 1, 2A and 2B, the heel 20 is secured to a heel portion (also called heel seat) of the sole assembly 30 via a rear end 15a of the shank 15. The heel 20 may be secured to the sole assembly 30 by an appropriate use of the shank 15 and screws 21 as shown in the preferred embodiment. The heel 20 is fixed with the support shank 15, and the heel seat is then covered with a desired material forming a specific rear inner sole 22 or part of the inner sole 33. The heel's forepart may optionally be covered by the outer sole 34.

[0032] Typically, the ratio between the height of the heel 20 and its diameter at the ground is at least 3:1. The heel can be provided in any height desired, such as, but not limited to, 4.5-12.0 cm. As shown in figure 1, the heel 20 comprises a heel lift 50 provided with at least one screw 51 or similar fixation element. In a preferred embodiment of the invention, the screw 51 is inserted in a detachable manner into a hollow of an inner core 40 of the heel 20. This inner core 40 is a molded piece made of thermoplastic material, preferably reinforced thermoplastic material. As illustrated, the screw head 51a may be located in a lower recess of the heel lift 50 and not in contact with the ground. A filling piece, (not shown) made of the same resilient material as the heel lift 50, may be located under the screw head 51a. The heel lift 50 is made of a mix of resilient material, preferably polyurethane resin, and fibre shredded pieces of tinctured carbon fibre twill of length 0.5-5.0 mm, preferably 2.0-4.0 mm. The heel lift 50 may be produced by injection moulding a thermoplastic resin containing pulverized material having a high tensile strength and low weight, preferably carbon fibre. The illustrated lift 50 is trapezoidal or rectangular at its cross-section but the cross-sectional shape thereof is not limited to this shape.

[0033] In a preferred embodiment, the heel 20 comprises carbon fibre in the inner core 40, in at least one wrapping element 42 laterally covering the inner core 40, in the shank 15 and optionally in the heel lift 50. Furthermore, the inner core 40 comprises a main portion without any screw, post or similar fixation element. Accordingly, use of carbon fibre and presence of such main portion enable efficient absorption of shocks and resulting vibrations. The inner core 40 is made of thermoplastic polyurethane resin epoxy foam or regular thermoplastic polyurethane resin mixed with shredded pieces of tinctured carbon fibre twill of length 0.5-5.0 mm, preferably 2.0-4.0 mm. In the exemplary embodiment of figure 1, 3 and 4, this inner core 40 is wrapped in one or several layers of prepreg tinctured carbon fibre twill of which the basis weight can vary. The wrapping element 42 may be a woven carbon fibre fabric impregnated with an epoxy-thermoplastic resin or other suitable impregnating material. The inner core 40 is moulded to make the desired shape.

[0034] The resin epoxy foam or resin is mixed with shredded pieces of tinctured carbon fibre twill of length 0.5-5.0 mm, preferably 2.0-4.0 mm in the range from 3-50 wt%, preferably 3-35 wt%, and more preferably 5-20 wt%. This mix produces a very light product with very low vibration conductivity. The inner core 40 is efficiently protected from breakage and vibration absorbability is further enhanced by the wrapping element 42. The heel 20 is more shock absorbent through effect of carbon fibre and becomes unbreakable under the pressure of human weight. The wrapping element 42 may be a coiling of appropriate material, such as, but not limited to, at least one fibre carbon strand, at least one band of twill incorporating carbon fibre.

[0035] High resistance of the heel is also immune to any external shock. There is no need to insert a steel rod to increase resistance and the heel 20 is therefore relieved from this unnecessary weight. The heel illustrated in figure 1 is a 10 cm common high heel 20 with a regular shape. The inner core 40 is wrapped in two layers of

tinctured carbon fibre twill with a basis weight of 193g/m^2. In this example, the inner core 40 with the wrapping element 42 thus weighs 14g, which is particularly light. More generally, the wrapping element 42 may weigh 50-500 g/m^2, preferably 100-300 g/m^2.

[0036] As shown in figure 2A, the heel seat may be covered by one or several layers of carbon composite material 44, for instance a layer of prepreg serge based on carbon fibre. This layer 44 prevents transmission of vibrations toward the user's heel. Phenolic resin or similar thermosetting resins may be used as additive in the layer 44.

[0037] As illustrated in figures 1, 3 and 4, there is no need to insert a long steel screw to fix the shank 15 to the heel 20. Fixation of the shank 15 in the high heel shoe 10 is permitted through at least two relatively short fixation means such as screws 21 having a flattened screw head 21a. The screws 21 are engaged into the wider portion 20a of the heel inner core 40 and remain distant from the high heel's thinner portion 20b, to which the heel lift 50 is fixed.

[0038] With reference to figures 2A and 2B, the shank 15 comprises a narrow intermediate portion and an enlarged first end 15a having at least two apertures 16 that are laterally spaced from each other, each traversed by one screw 21 or similar fixing means. At the second end, the shank 15 splits into two, making a semi-circular shape forming a fork f. The fork shape has several advantages because three points of stability are provided (two points of stability in the forepart, the third being the heel lift) and this ensures lateral stability of the foot at the main inflexion point during the walking and secures the user's heel. Even when the user stands still, the necessary effort to keep in equilibrium is far less strenuous since there is support across the external foot arch. For manufacturing reasons, the semi-circular shape forming a fork f may be filled across resulting in further support for the metatarsal heads of the foot and greater strength still. At the two ends of the semi-circular shape of the shank, there are two circular holes 17 cut out into it. In each of the holes 17 fits exactly a shock absorber 35. Such shock absorber 35 may be a half-globe shaped piece made of silicone rubber or latex or similar resilient material. The flat surface of the half-globe shaped piece overrides by a slight amount in order to keep the piece in place into the hole 17. The two shock absorbers 35 can be left loose since they are pressed from the top and bottom by the respective soles 32, 34 of the sole assembly 30. Those shock absorbers 35 provide extra cushioning at those two points.

[0039] Instead of shock absorbers 35, another possibility (not shown) is to have one piece made of silicone, rubber or latex or similar resilient material from, atop and covering fork segment 15b to, atop and covering fork segment 15c, fixed to shank 15 with protruding shapes where holes 17 are located so as to fit exactly into such holes, thus maintaining this piece appropriately fixed to the shank 15 and in place. By virtue of this arrangement, the entire area that is under pressure from the metatarsal heads of the foot, at the level of the ball of the foot, would be covered.

[0040] The respective forked segments 15b, 15c of the shank 15 are located under the first and between the fourth and fifth metatarsal heads because it is both points that request most support. Another reason is that by being as spread apart as possible across the width of the forefront of the shoe, a great deal of lateral stability is gained. Also such forked ends of shank 15 form, with the heel, a support triangle which naturally follows the foot's natural pressure areas. Thanks to this support, equilibrium and comfort of the user is improved. At standstill, the wearer's full weight is therefore spread between her two feet over six points instead of four, or two support triangles, one for each foot. As a result, the shank 15 is subjected to a more homogeneous sharing out of weight and risks of breakage are advantageously and significantly reduced. Of course, several positions adjacent to metatarsal heads may be adopted for the fork ends to form an appropriate supporting triangle.

[0041] As shown in figures 2A and 2B, the split second end of the shank 15 may extend wider in a transversal direction than does the first enlarged end 15a. The second end provided with transversal extension d2 of the fork f is located in the area of the arch profile 32c, next the fore part 32d, while the first end 15a provided with the transversal extension d1 is located adjacent to the heel end 32b. For instance the shank 15 is more than 10cm long (for instance 16cm) and d1 and d2 are respectively 15-40mm and 40-70mm long. In the exemplary embodiment of the figure 2B, the two segments 15b, 15c of the fork f may be orientated to the right to improve the support effect for a left foot. Symmetrically in a shoe suitable for a right foot (not shown), the fork f may be orientated to the left side of the shoe. As shown in figures 5-6, two screws 150 may be used to adjust the position of fork f.

[0042] More generally, the intermediate portion of the shank 15 may be provided with a longitudinal median plane, the fork f and eventually the first end 15a being arranged asymmetrically. By combining at least two support surfaces and the enlarged first end 15a, the shank 15 forms an embedded system for providing lateral stability. The thickness of the shank 15 may be constant (between 0,1cm and 0,4cm for example), excepting the fork f with a reduced thickness. The shank 15 thus may have a slight gradual elasticity towards the ends of the fork f. The local reduction of thickness may be obtained, for instance through use of a thinner layer of epoxy resin or of aluminium. Consequently, the metatarsal heads of the user's foot would still benefit from a strong lateral stability without constraining, in any way possible, the necessary flexion of this area of the shoe during the walking.

[0043] In a preferred embodiment, the shank 15 includes an elongated thin inner metallic piece, such as aluminium, covered by at least one layer of tinctured car-

bon fibre material. The metallic piece is enlarged to form the first end 15a of the shank 15. Such first end 15a enables an efficient rear fixation of the shank 15. The screws 21 are laterally spaced from each other as shown in figures 2A and 2B, to avoid any lateral or upward movements, of either part, of the shank 15 from the heel seat onto which it is fixed. Thickness of the metallic piece is for example half a millimetre and weight of the shank 15 may be decreased to 4g for the shank 15 through use of carbon fibre layers. Thinness of such shank 15 (2mm for instance) is an advantage for shoe production when the inner and outer soles 22, 32 have to be stitched and glued together.

[0044] With reference to figure 1, the heel's wider portion 20a comprises at least two inserts 210 fitted into the inner core 40 of the high heel 20. These inserts 210 may be cylindrical steel or carbon pieces, located in said high heel wider portion 20a only. The screws 21 are respectively introduced into the inserts 210, which are anchored in the inner core 40. The inserts 210 are preferably carbon pieces weighing together less than one gram, which is particularly light. In the exemplary embodiment of the figures, inserts 210 have a length of one centimeter and a width of seven millimeters. Other suitable fixation means may replace inserts 210, such as, but not limited to, threaded cavities into the inner core 40, elements with female and/or male forms. As a result, linear translation of the screws 21 or other analog-fixture element engaged with the enlarged first end 15a of the shank 15 is prevented.

[0045] As shown in figures 3-6, the same shank 15 may be used for different shoes sizes for either a right shoe or of a left shoe. In one of the bigger sizes, screws 21 are located in a first position adjacent the heel end 32b. With a smaller shoe size, screws 21 are inserted in a second position at the opposite of the first position, in the heel seat. As shown in figures 3-6, position of the fork f and the two corresponding supporting surfaces is not modified when changing shoe size and a good stability is thus obtained with exactly the same shank 15. Referring now to figure 1, each of said inserts 210 extends along an axis 200 forming an angle B comprised between 15° and 50° relative to a longitudinal axis A of the high heel thinner portion 20b. In other words, each of the screws 21 is inclined and the respective screw heads 21a are slightly maintained parallel to the enlarged first end 15a of the shank 15. Engagement and clamping of the first end 15a of the shank is improved through this geometric position of the screw 21. In another embodiment (not shown), inclination of the heel seat may be also modified.

[0046] The wider portion 20a of the heel in contact with the sole assembly 30 is sufficiently large to receive the inserts 210 for the smallest women shoe sizes, for instance European size "34" as in figures 3 and 4, and for the largest women shoe sizes, for instance European size "43" as in figures 4 and 6. Theses examples of shoes 10a, 10b are not limitative and high heel shoes of bigger and smaller sizes may be obtained.

[0047] In the heel seat, two inserts 210 of 1cm in length and 0,7cm wide, lined up on the breadth of the heel seat, are moulded in the heel 20 and allow to hereby receive flat screws 32 in stainless steel fixing the shank 15 to the heel 20. Such light and resistant inserts 210 enable efficient fixing of the shank and can support the weight of any person, even in shoes having a stiletto heel of important height. This fixing avoids the use of a long soaked steel screw and two or three nails to fix the shank 15 to the heel 20 and to the outsole 32. All these elements are high conductors of vibrations and provide a poor fixture of the shank to the heel 20. Moreover, weight reduction is of at least 10 g.

[0048] The heel 20 for a high heel shoe 10 may be produced by mixing thermoplastic resin and material including carbon fiber twill, such material including but not limited to shredded pieces of tinctured carbon fibre twill of length 0.5-5.0 mm, preferably 2.0-4.0 mm into a mould to form the high heel's inner core 40. In one preferred embodiment of the invention, the thermoplastic resin is chosen amongst polyurethane epoxy foams and is cast onto a determined amount of carbon fibre into the mould.

[0049] The shape of the inner core 40 is obtained during this operation, with the wider end 20a and the thin end 20b. A preform may be prepared and cured into final shape. A step of wrapping or coiling inner core 40 may be performed to cover and protect the inner core 40. Such wrapping is performed on the full lateral surface or on the thinner, weaker part of the inner core 40. At least one layer of material including carbon fibre is used to form the wrapping element 42. A metallic layer, containing for instance aluminium and/or one of its alloys, may form an intermediate wrapping layer. After being wrapped or coiled around the inner core 40, the wrapping or coiling element may be cured to improve its resistance. A high lateral impact resistance as well as a high global resistance is obtained for the heel 20. The heel lift 50 is fixed into the inner core 40 after the step of wrapping.

[0050] The present invention has been described in connection with the preferred embodiments. These embodiments, however, are merely for example and the invention is not restricted thereto. It will be understood by those skilled in the art that other variations and modifications can easily be made within the scope of the invention as defined by the appended claims, thus it is only intended that the present invention be limited by the following claims. For instance, the invention may be implemented in any shoes having a high heel, for instance boots. Furthermore, the heel lift as described is only a preferred option and may be replaced by any component suitable for ground contact.

Claims

1. A high heel shoe (10) comprising a sole assembly (30), a shank (15), a high heel (20), at least one fix-

ation device to fix the shank (15) to the high heel (20), the high heel (20) comprising a wider portion (20a) and a thinner portion (20b), **characterized in that** the shank (15) extends along a longitudinal direction and comprises a first end (15a), a narrow intermediate portion and a second end providing two support surfaces distant from each other along a lateral direction extending crosswise relative to said longitudinal direction, the shank's first end (15a) being enlarged relative to the intermediate portion and in contact with the high heel wider portion (20a).

2. The high heel shoe of claim 1, wherein said at least one fixation device comprises two spaced fixation devices (21, 210).

3. The high heel shoe of claim 2, wherein the fixation devices (21, 210) are distant from the high heel's thinner portion (20b).

4. The high heel shoe of one of the claims 1-3, wherein the enlarged first end (15a) of the shank (15) presents at least two apertures (16) that are laterally spaced from each other, each traversed by one screw (21).

5. The high heel shoe of the claims 1-4, wherein each of said fixation devices comprises:

- at least one first retaining element (21a) engaged with said enlarged first end (15a);
- at least one second retaining element (210) engaged with the high heel's wider portion (20a); and
- a linking element integral with at least one of said first and second retaining elements (21a, 210), traversing said enlarged first end (15a).

6. The high heel shoe of one of the claims 1-5, wherein the shank second end comprises a fork (f) with lateral extension wider than lateral extension of said first enlarged end (15a).

7. The high heel shoe of one of the claims 1-6, wherein the shank second end comprises a fork (f) with two segments (15b, 15c), said shoe (10) being either suitable for a left foot with said fork (f) orientated to the right side of the shoe, or suitable for a right foot with said fork (f) orientated to the left side of the shoe.

8. The high heel shoe of one of the claims 1-7, wherein the shank (15) is of a Y-shape.

9. The high heel shoe of one of the claims 1-8, wherein the shank (15) comprises a metallic piece or at least one layer of plastic material wrapped or coiled with a material containing carbon fiber, said shank having a thickness lower than 0,3mm.

10. The high heel shoe of claim 9, wherein the shank (15) is sufficiently thin to be lighter that 10 g.

11. The high heel shoe of one of the claims 1-10, wherein the second end comprises two laterally spaced holes (17), the sole assembly (30) comprising two cushioning elements (35) respectively received in said holes or one cushioning element fixed in said holes (17).

12. The high heel shoe of one of the claims 1-11, wherein said fixation devices comprise screws (21) shorter than 30mm, preferably shorter than 18mm.

13. The high heel shoe of claim 5, wherein said second retaining element (210) is a tubular insert based on carbon, having external ribs for engagement in a cavity of the high heel's wider portion (20a).

14. An assembly of high heel shoes (10a, 10b) comprising a first shoe (10a) of a first size according to one of the claims 1-13 and a second shoe (10b) of a second size according to one of the claims 1-13, all suitable either for a right foot, or for a left foot, said second size being higher than said first size, **characterized in that** the shank of the first shoe (10a) is identical to the shank of the second shoe (10b).

15. A shank for the high heel shoe of one of the claims 1-13.

Amended claims in accordance with Rule 137(2) EPC.

1. A high heel shoe (10) comprising a sole assembly (30), a shank (15), a high heel (20), at least one fixation device to fix the shank (15) to the high heel (20), the high heel (20) comprising a wider portion (20a) and a thinner portion (20b), the shank (15) extending along a longitudinal direction and comprising a first end (15a), a narrow intermediate portion and a second end that provides two support surfaces distant from each other along a lateral direction extending crosswise relative to said longitudinal direction, the shank first end (15a) being enlarged relative to the intermediate portion and in contact with the high heel wider portion (20a), **characterized in that** the shank second end comprises a fork (f) with lateral extension wider than lateral extension of said first enlarged end (15a), said fork (f) being provided with said two support surfaces that extend separately, one under the first metatarsal head and the other between the fourth and fifth metatarsal heads, and **in that** each of said fixation devices comprises:

- at least one first retaining element (21a) engaged with said enlarged first end (15a);
- at least one second retaining element (210) engaged with the high heel's wider portion (20a); and
- a linking element integral with at least one of said first and second retaining elements (21a, 210), traversing said enlarged first end (15a).

2. The high heel shoe of claim 1, wherein said at least one fixation device comprises two spaced fixation devices (21, 210) that are distant from the high heel's thinner portion (20b).

3. The high heel shoe of claim 1 or 2, wherein said second retaining element (210) is a tubular insert based on carbon, having external ribs for engagement in a cavity of the high heel's wider portion (20a).

4. The high heel shoe of one of the claims 1-3, wherein the enlarged first end (15a) of the shank (15) presents at least two apertures (16) that are laterally spaced from each other, each traversed by one screw (21).

5. The high heel shoe of one of the claims 1-4, wherein the shank (15) is of a Y-shape.

6. The high heel shoe of one of the claims 1-5, wherein the shank second end comprises a fork (f) with two segments (15b, 15c), said shoe (10) being either suitable for a left foot with said two segments of the fork (f) orientated to the right side of the shoe, or suitable for a right foot with said two segments of the fork (f) orientated to the left side of the shoe.

7. The high heel shoe of one of the claims 1-6, wherein the shank (15) comprises at least one layer of plastic material wrapped or coiled with a material containing carbon fiber, said shank having a thickness lower than 0, 3mm.

8. The high heel shoe of one of the claims 1-7, wherein the shank (15) comprises a metallic piece wrapped or coiled with a material containing carbon fiber, said shank having a thickness lower than 0,3mm.

9. The high heel shoe of claim 7 or 8, wherein said material containing carbon fiber is tinctured carbon fiber material.

10. The high heel shoe of one of the claims 7-9, wherein the shank (15) is sufficiently thin to be lighter that 10 g.

11. The high heel shoe of one of the claims 1-10, wherein the second end comprises two laterally spaced holes (17), the sole assembly (30) comprising two cushioning elements (35) respectively received in said holes or one cushioning element fixed in said holes (17).

12. she high heel shoe of one of the claims 1-11, wherein said fixation devices comprise screws (21) shorter than 30mm, preferably shorter than 18mm.

13. The high heel shoe of one of the claims 1-12, wherein maximum thickness of the shank (15) is not higher than 2mm.

14. An assembly of high heel shoes (10a, 10b) comprising a first shoe (10a) of a first size according to one of the claims 1-13 and a second shoe (10b) of a second size according to one of the claims 1-13, all suitable either for a right foot, or for a left foot, said second size being higher than said first size, **characterized in that** the shank of the first shoe (10a) is identical to the shank of the second shoe (10b), said high heel shoes each having a heel inclined relative to a plane defining the base of the high heel shoe.

15. The assembly of claim 14, wherein each of said high heel shoes has the shank first end (15a) inclined relative to a horizontal fore part 32d of the high heel shoe.

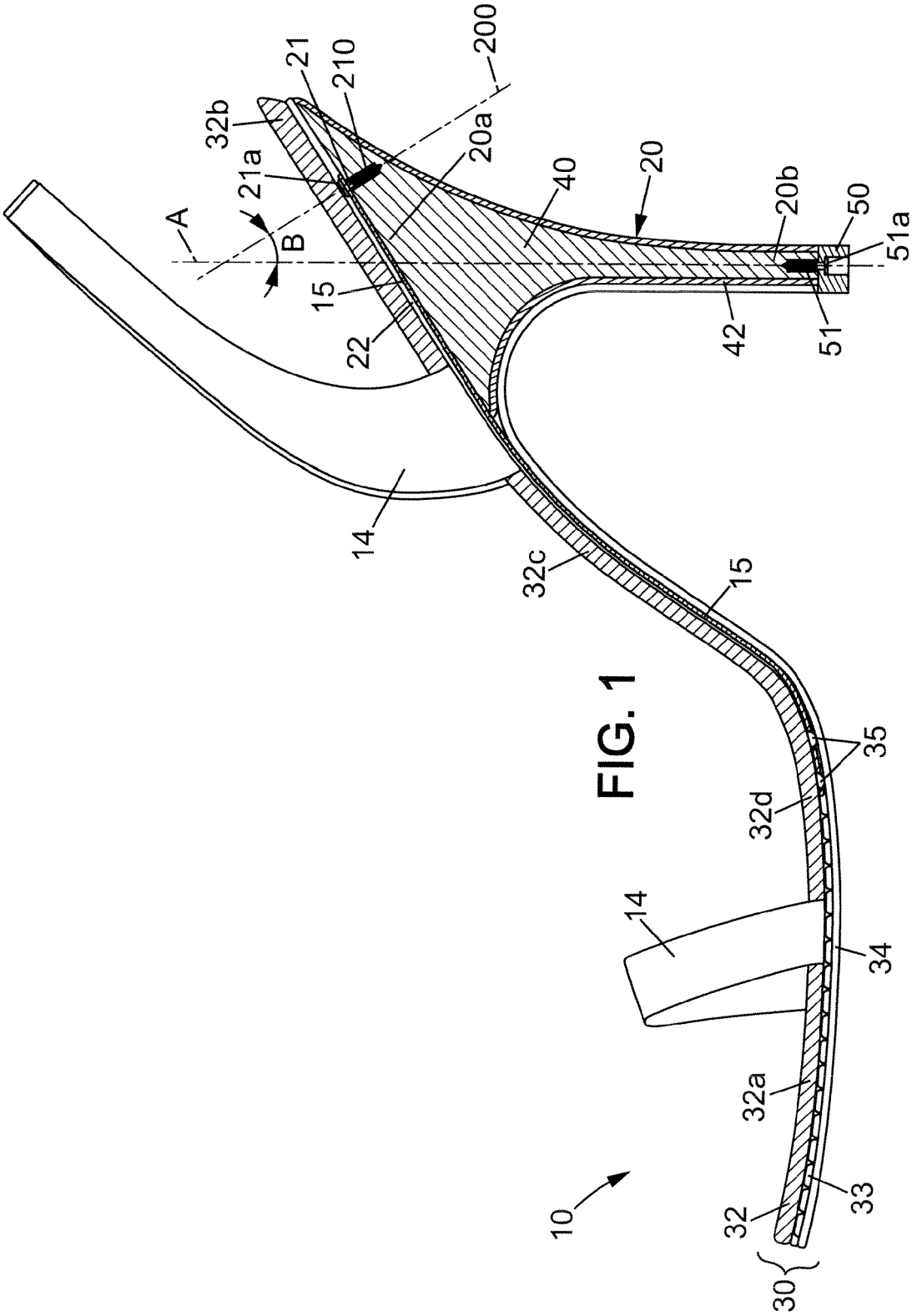
200
21
210
32b
21a
20a
40
20
20b
50
51a
A
B
15
22
42
51
14
32c
15
35
32d
14
34
32a
33
32
30
10

FIG. 1

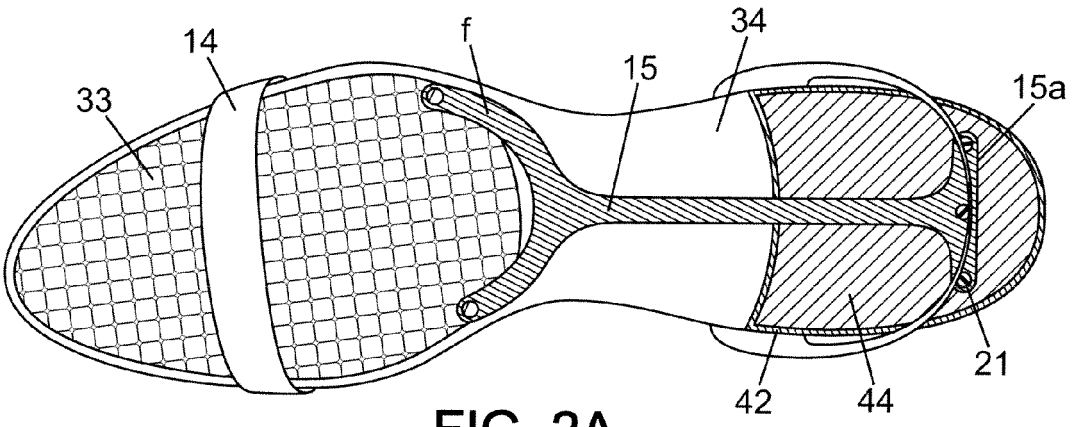

FIG. 2A

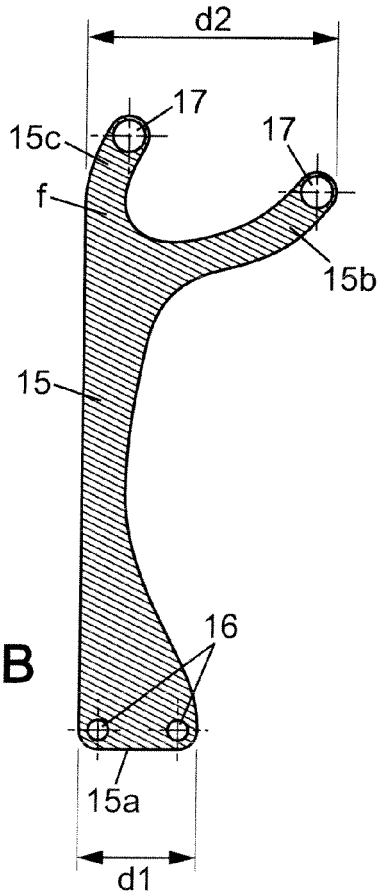

FIG. 2B

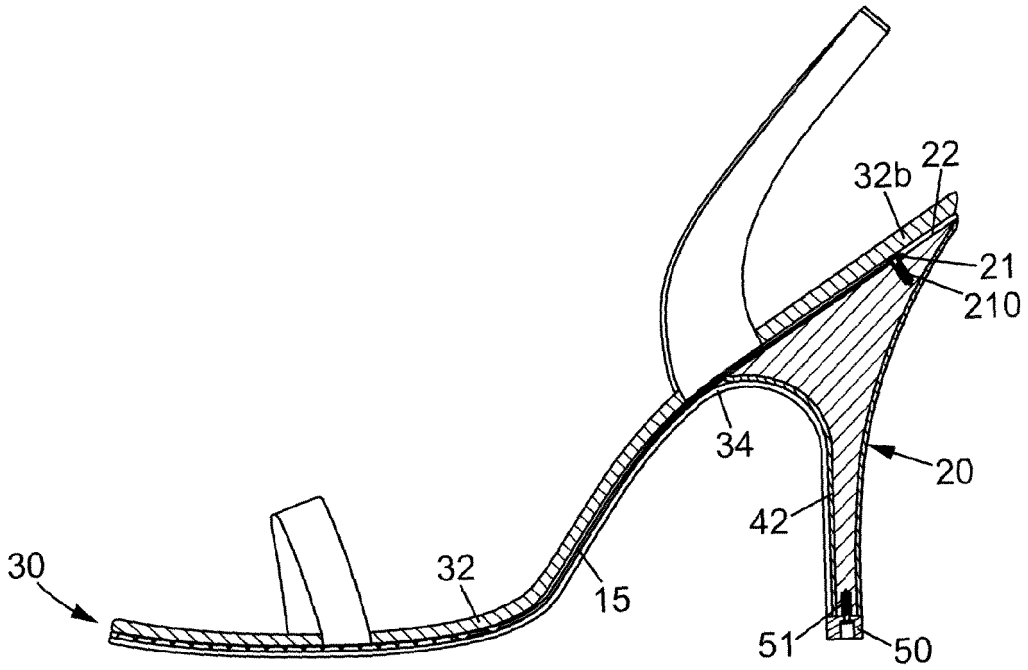

FIG. 3

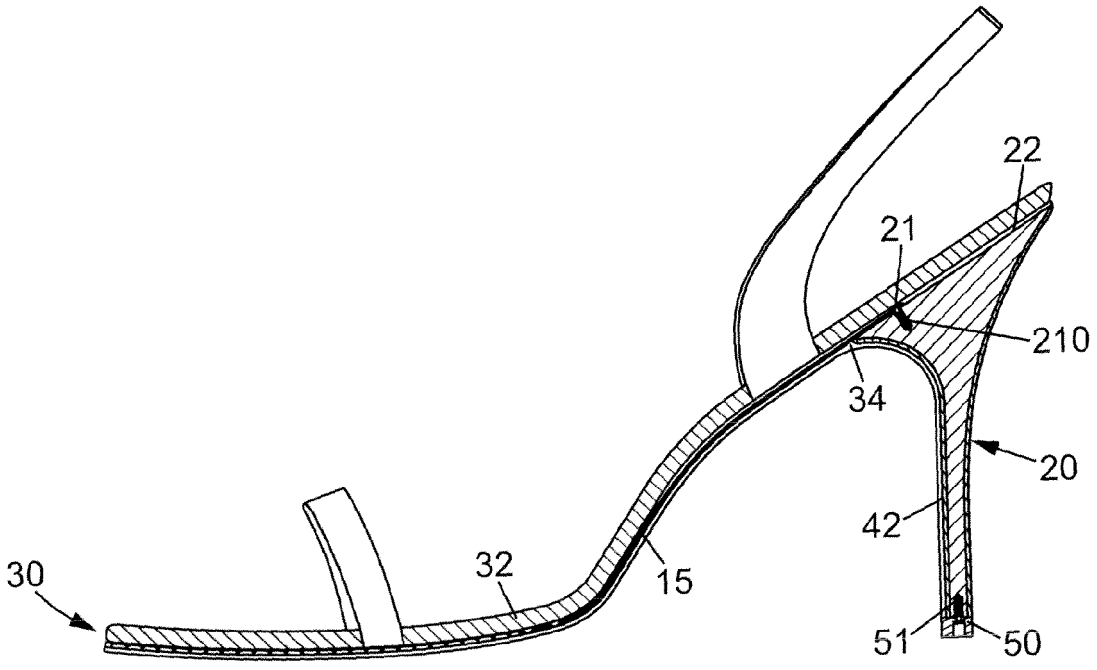

FIG. 4

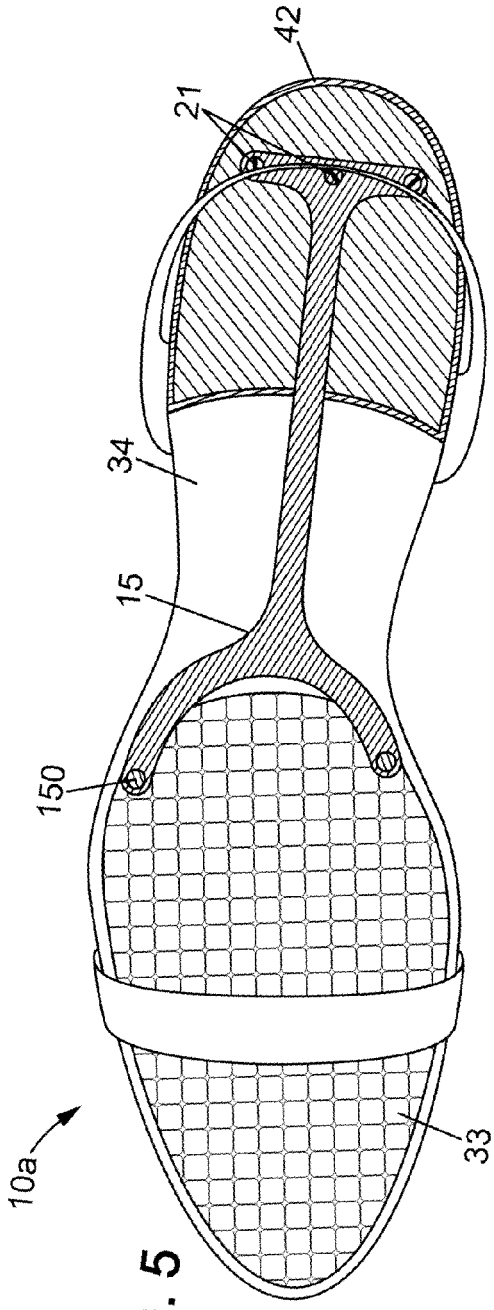

FIG. 5

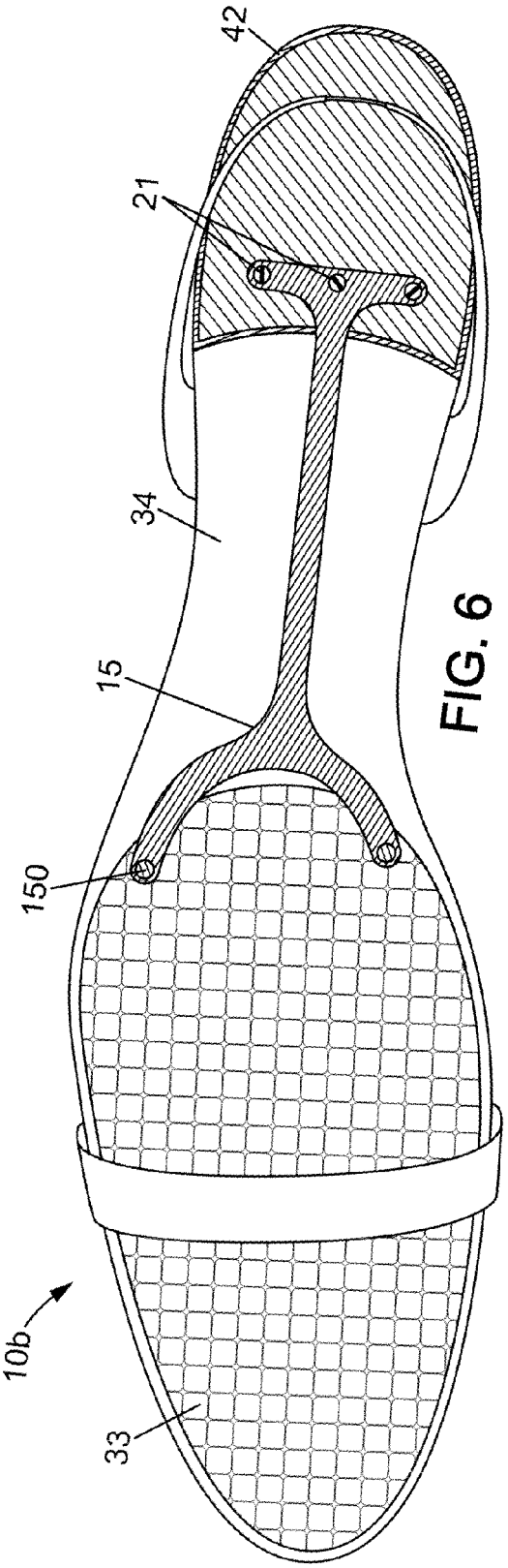

FIG. 6

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EUROPEAN SEARCH REPORT

Application Number
EP 08 30 5398

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	3 November 2008	Schölvinck, Thérèse

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