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(54) **SHOE, SOLE, AND INSOLE WITH FOAM EXTENDING THROUGH INSOLE BOARD**

(57) Disclosed are shoes, soles, and insoles with foam extending through the insole board, and processes for manufacturing them. In one embodiment, the insole includes a board having an upper surface, a lower surface, and a hole extending from the upper surface to the lower surface; and a foam pad adhered to the upper surface of the board, the foam pad extending into the hole.

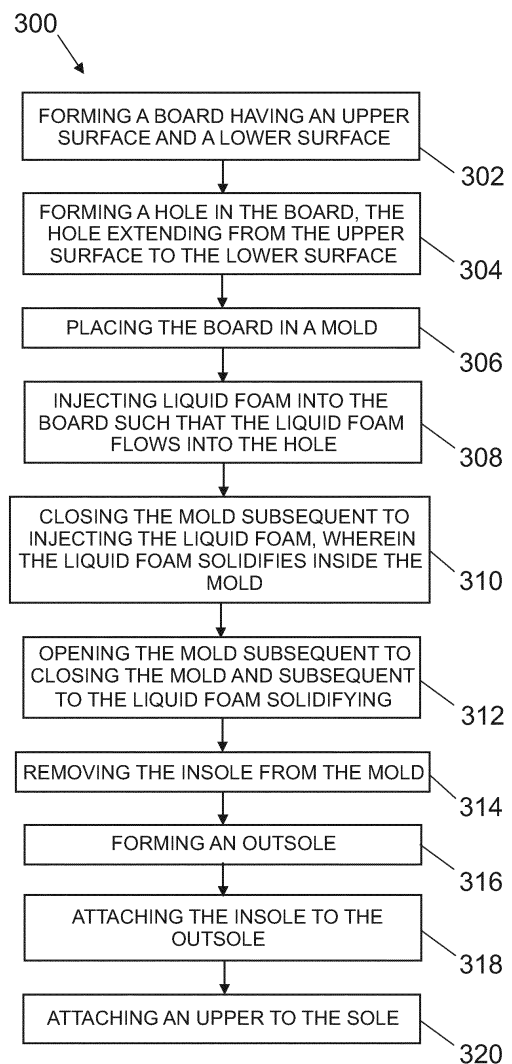


Fig. 3

Description

Description of Related Art

[0001] The disclosed technology relates generally to insoles for shoes, and more particularly some embodiments relate to insoles that include foam pads for comfort.

Brief Summary of the Disclosure

[0002] In general, one aspect disclosed features an insole for a shoe, the insole comprising: a board having an upper surface, a lower surface, and a hole extending from the upper surface to the lower surface; and a foam pad adhered to the upper surface of the board, the foam pad extending into the hole.

[0003] Embodiments of the insole may include one or more of the following features. In some embodiments, the foam protrudes through the hole, and below the lower surface of the board. In some embodiments, the foam adheres directly to the upper surface of the board. In some embodiments, the foam pad includes a plurality of second holes therethrough, the second holes being arranged near an edge of the hole in the board. In some embodiments, the foam pad comprises an open-cell polyether foam. In some embodiments, the hole is located where a ball of a wearer's foot would rest. In some embodiments, the foam pad includes a heel bump located where a heel of a wearer's foot would rest. In some embodiments, the foam pad comprises: an arch support. In some embodiments, the board comprises: an upper paper layer; a lower paper layer; and a metal shank disposed between the upper paper layer and the lower paper layer.

[0004] In general, one aspect disclosed features a sole for a shoe, the sole comprising: an insole comprising: a board having an upper surface, a lower surface, and a hole extending from the upper surface to the lower surface, and a foam pad adhered to the upper surface of the board, the foam pad extending through the hole, and having a protuberance extending below the lower surface; and an outsole having a recess formed therein, wherein the protuberance of the insole is disposed within the recess of the outsole.

[0005] Embodiments of the sole may include one or more of the following features. In some embodiments, the foam adheres directly to the upper surface of the board. In some embodiments, the foam pad includes a plurality of second holes therethrough, the second holes being arranged near an edge of the hole in the board. In some embodiments, the foam pad comprises an open-cell polyether foam. In some embodiments, the hole is located where a ball of a wearer's foot would rest. In some embodiments, the foam pad includes a heel bump located where a heel of a wearer's foot would rest. In some embodiments, the foam pad comprises: an arch support. In some embodiments, the board comprises: an upper paper layer; a lower paper layer; and a metal shank dis-

posed between the upper paper layer and the lower paper layer.

[0006] In general, one aspect disclosed features a shoe, comprising: an insole comprising: a board having an upper surface, a lower surface, and a hole extending from the upper surface to the lower surface, and a foam pad adhered to the upper surface of the board, the foam pad extending through the hole, and having a protuberance extending below the lower surface; an outsole having a recess formed therein, wherein the protuberance of the insole is disposed within the recess of the outsole; and an upper attached to the outsole.

[0007] Embodiments of the shoe may include one or more of the following features. In some embodiments, the foam adheres directly to the upper surface of the board. In some embodiments, the foam pad includes a plurality of second holes therethrough, the second holes being arranged near an edge of the hole in the board. In some embodiments, the foam pad comprises an open-cell polyether foam. In some embodiments, the hole is located where a ball of a wearer's foot would rest. In some embodiments, the foam pad includes a heel bump located where a heel of a wearer's foot would rest. In some embodiments, the foam pad comprises: an arch support. In some embodiments, the board comprises: an upper paper layer; a lower paper layer; and a metal shank disposed between the upper paper layer and the lower paper layer.

[0008] In general, one aspect disclosed features a process for making an insole for a shoe, the process comprising: placing a board in a mold, the board having an upper surface, a lower surface, and a hole extending from the upper surface to the lower surface; and injecting liquid foam onto the board such that the liquid foam flows into the hole.

[0009] Embodiments of the process may include one or more of the following features. Some embodiments comprise injecting the liquid foam onto the board such that the liquid foam flows through the hole, and below the lower surface of the board. In some embodiments, injecting the liquid foam onto the board comprises: injecting the liquid foam directly onto the board. Some embodiments comprise closing the mold subsequent to injecting the liquid foam, wherein the liquid foam solidifies inside the mold; opening the mold subsequent to closing the mold and subsequent to the liquid foam solidifying; and removing the insole from the mold. Some embodiments comprise forming the hole in the board. Some embodiments comprise disposing a metal shank between an upper paper layer and a lower paper layer of the board. In some embodiments, the liquid foam comprises an open-cell polyether foam. In some embodiments, the mold forms a plurality of second holes through the foam, the second holes being arranged near an edge of the hole in the board, the second holes allowing gas to escape the mold through the second holes. In some embodiments, the hole is located where a ball of a wearer's foot would rest. In some embodiments, the mold forms

a heel bump in the foam, the heel bump being located where a heel of a wearer's foot would rest. In some embodiments, the mold forms an arch support in the foam.

Brief Description of the Drawings

[0010] The present disclosure, in accordance with one or more various embodiments, is described in detail with reference to the following figures. The figures are provided for purposes of illustration only and merely depict typical or example embodiments.

FIG. 1 is a top view of an example insole according to embodiments of the disclosed technology.

FIG. 2 is a side view of the example insole of FIG. 1 according to embodiments of the disclosed technology.

FIG. 3 illustrates a process for manufacturing insoles, soles, and shoes according to embodiments of the disclosed technology.

FIG. 4 is a top view of an example board according to embodiments of the disclosed technology.

FIG. 5 depicts an example lower mold according to embodiments of the disclosed technology.

FIG. 6 illustrates the construction of a sole using the example insole and an outsole 602 according to embodiments of the disclosed technology.

FIG. 7 illustrates an example shoe fabricated using the disclosed insole according to embodiments of the disclosed technology.

FIG. 8 illustrates an example shoe fabricated using the disclosed insole 100 and a sole with no recess according to embodiments of the disclosed technology.

[0011] The figures are not exhaustive and do not limit the present disclosure to the precise form disclosed.

Detailed Description

[0012] Currently, conventional insoles comprise a board, which can be fabricated from cardboard or the like. For comfort, some conventional insoles add a foam pad on top of the board. While this arrangement provides additional comfort to the wearer of the shoe, it requires additional room inside the shoe to accommodate the thickness of the foam. This requirement necessitates increasing the size of the shoe, which is undesirable because it requires modification of the shoe to accommodate the comfort insole. Furthermore, this modification changes the appearance and style of the shoe.

[0013] Embodiments of the disclosed technology provide shoes, soles and insoles with foam extending through the insole board. That is, a hole is formed in the board, and foam is added to the upper surface of the board, such that the foam extends into the hole. In some embodiments, the foam extends through the hole, and protrudes below the lower surface of the board. These arrangements allow the foam to have additional thickness, and therefore provide additional comfort, without changing the size or style of the shoe. Accordingly, shoes that incorporate this technology are indistinguishable in size and appearance from shoes with no comfort insole.

[0014] In some embodiments, the foam adheres directly to the upper surface of the board without the use of adhesive. In other embodiments, an adhesive may be used to attach the foam to the board.

[0015] In some embodiments, the insole is formed in a mold, for example by placing the board in the mold, and injecting liquid expanding foam onto the upper surface of the board before closing the mold. In such embodiments, the mold may form a plurality of escape holes near the edge of the hole in the board to allow gas to escape the mold.

[0016] In some embodiments, the foam comprises an open-cell polyether foam.

[0017] In some embodiments, the insole includes a metal shank disposed between two layers of paper.

[0018] In some embodiments, the hole in the board is located where the ball of the wearer's foot would rest. In other embodiments, the hole may be formed in other locations in the board, for example where the heel of the wearer's foot would rest. In some embodiments, multiple holes may be formed in the board.

[0019] In some embodiments, the foam may form one or more raised portions having additional thickness. For example, the foam may form a heel bump, an arch support, and the like.

[0020] FIG. 1 is a top view of an example insole 100 according to embodiments of the disclosed technology. While in the example of FIG. 1, the insole 100 is for a woman's dress shoe, it should be understood that the disclosed technology is not limited to women's dress shoes, and applies to any shoe for any person of any age for any use. For example, the technology may be applied to men's shoes, children's shoes, active shoes, dress shoes, casual shoes, shoes for particular medical needs, and the like. It should also be understood that the foregoing applications are presented by way of example, and are not to be considered limiting.

[0021] Referring to FIG. 1, the insole 100 includes a foam pad 102. In some embodiments, the foam pad 102 comprises an open-cell polyether foam. Open-cell polyether foam has numerous properties that render it a good choice for insole pads. Open-cell polyether foam exhibits a low resistance to compression, a property which allows the foam to absorb shocks that may cause discomfort. Open-cell polyether foam also exhibits quick recovery from compression, a property which allows the foam to

rebound from shock, and therefore to be ready to absorb a subsequent shock. Open-cell polyether foam is also quite resistant to moisture, and has antibiotic properties. These properties make open-cell polyether foam an excellent and therefore popular choice for insole pads. However, in other embodiments, other types of foam may be used instead of, or in addition to, open-cell polyether foam.

[0022] The foam pad 102 may be disposed upon the upper surface of the board 104. The board 104 may be fabricated from materials such as cardboard, paper, cellulose, and the like, and combinations thereof. In some embodiments, the board may include a metal shank (not shown). The metal shank may be disposed between two layers of paper. In some embodiments, the paper may be fabricated from carbon or the like. In other embodiments, the paper may be fabricated from other materials, either alone, or in combination with carbon.

[0023] The foam pad 102 includes an area of additional thickness, shown at 106, where the ball of the foot will rest. As described in detail below, this area of additional thickness 106 may be achieved by forming a hole in the board 104, and causing the foam pad 102 to extend into the hole. In such embodiments, the thickness of the board 104 that was removed to create the hole is replaced by the foam, thereby achieving additional thickness of the foam pad 102 without increasing an overall thickness of the insole. In some embodiments, the foam pad 102 extends through the hole, and protrudes below the lower surface of the board 104, thereby achieving additional thickness of the foam pad 102. In some embodiments, a recess is formed in the outsole to receive the protruding foam pad 102. In such embodiments, a very thick foam pad 102 may be achieved without reducing the room inside the shoe. Therefore, none of these embodiments require modifications to the upper of the shoe.

[0024] In some embodiments, the insole 100 is formed in a mold. In some cases, gas may become trapped in the mold. The trapped gas may adversely affect the fabrication process, for example by creating voids in the foam as it solidifies. In some embodiments, the foam pad 102 of the insole 100 may be formed to include a plurality of escape holes, as shown at 108, which allow any otherwise trapped gas to escape the mold. Allowing trapped gas to escape avoids the formation of voids in the foam pad 102.

[0025] In some embodiments, the foam pad 102 includes one or more raised sections having increased thickness. For example, referring to FIG. 1, the example insole 100 includes a heel bump 112, and an arch support 110. These raised sections provide additional comfort and support in these areas of the foot. In some embodiments, these raised sections may be fabricated in the same manner as the area of additional thickness 106 at the ball of the foot. That is, the raised sections may be fabricated by removing portions of the insole board 104, and allowing the foam pad 102 to replace the removed portions of the board 104, and even to extend below the board 104.

[0026] FIG. 2 is a side view of the example insole 100 of FIG. 1 according to embodiments of the disclosed technology. Referring to FIG. 2, it can be seen that the foam pad 102 is disposed upon the upper surface of the board 104. In this example, the foam pad 102 also extends through the hole in the board 104, and protrudes below the lower surface of the board 104. In FIG. 2, a heel bump 112 is depicted as well.

[0027] Any thicknesses may be selected for the foam pad 102 and the board 104. In some embodiments, the thickness of the board 104 is 1.5 mm, the thickness of the pad 102 above the board is 1.8 mm, and the thickness of the foam pad 102 extending below the board 104 is 1.5 mm. In this embodiment, the total thickness of the foam pad is the sum of these measurements, which is 4.8 mm. In some embodiments, the total thickness of the heel bump is 3.8 mm. These dimensions are provided only by way of example, and should not be construed as limiting in any way.

[0028] FIG. 3 illustrates a process 300 for manufacturing insoles, soles, and shoes according to embodiments of the disclosed technology. Referring to FIG. 3, the process 300 may include forming a board 104 having an upper surface and a lower surface, at 302. The board 104 may be formed in any manner. For example, the board 104 may be formed by conventional manufacturing techniques currently used to form conventional insole boards.

[0029] FIG. 4 is a top view of an example board 104 according to embodiments of the disclosed technology. Referring to FIG. 4, the board 104 has been formed to fit a left shoe. This process may include cutting the board 104 to achieve the desired outline, for example using a laser cutting machine, or the like.

[0030] Referring again to FIG. 3, the process 300 may include forming a hole in the board, the hole extending from the upper surface to the lower surface, at 304. Referring again to FIG. 4, a hole 402 has been formed in the example board 104 where the ball of the foot would rest. Any process may be used to form the hole 402, for example using a laser cutting machine, or the like. In some embodiments, the hole 402 may be formed by cutting the board 102. In the described embodiments, the hole is formed at the ball of the foot, as this is the part of the foot where users commonly experience discomfort that can be remedied by a comfort insole. In other embodiments, one or more holes may be formed elsewhere in the board 104 instead of, or in addition to, the hole 402 formed at the ball of foot.

[0031] Referring again to FIG. 3, the process 300 may include placing the board 104 in a mold. FIG. 5 depicts an example lower mold 500 according to embodiments of the disclosed technology. Referring to FIG. 5, the lower mold 500 includes 2 cavities 502, including a cavity 502a for fabricating a right-foot insole, and a cavity 502b for fabricating a left-foot insole. The boards 104 may be inverted, and placed into the cavities 502 such that the upper surfaces of the boards 104 face downward into the cavities 502. The lower mold 500 may include clips to

retain the boards 104 during the molding process. The lower mold 500 may be kept horizontal, with the cavities 502 facing upward, during the molding process. The lower mold 500 may include clips to retain the boards 104 during the molding process.

[0032] In some embodiments, the cavities 502 may include voids to form raised sections, such as heel bumps 112, arch supports 110, and the like. In embodiments where the foam 102 is to protrude below the lower surface of the board 104, an upper mold (not shown) may include voids that allow the foam to flow upwards through the holes 402 in the boards 104 to fill those voids as the mold is closed.

[0033] Referring again to FIG. 3, the process 300 may include injecting liquid foam onto the boards 104 such that the liquid foam flows into the holes 402 in the boards 104, at 308. In the example of FIG. 5, the liquid foam may be injected directly into the holes 402 in the boards 104 as they are held in the mold. The holes 402 allow the liquid foam to flow into and fill the cavities 502 in the lower mold 500. In embodiments that include escape holes 108, the lower mold 500 may include a plurality of pegs 504 to form those escape holes 108. The escape holes 108 may allow gas to escape the mold.

[0034] Referring again to FIG. 3, the process 300 may include closing the mold subsequent to injecting the foam, at 310. That is, an upper mold (not shown) may be lowered so as to mate with the lower mold 500. In some embodiments, the foam may be allowed to expand for an interval of time before closing the mold. The mold may be kept closed while the liquid foam solidifies. Subsequent to the liquid foam solidifying, the mold may be opened, at 312. After opening the mold, the insoles 100 may be removed from the mold, at 314.

[0035] In some embodiments, the example process 300 of FIG. 3 may continue, to fabricate soles using the insoles 100. Referring to FIG. 3, the process 300 may include forming an outsole, at 316. The outsole may be fabricated using conventional materials and processes. For example, the outsole may be fabricated of rubber through an injection molding process or the like. The process 300 may include attaching the insole to the outsole to form the sole, at 318. The insole may be attached to the outsole using any conventional process, for example using glue, stitching, and the like. In some embodiments, the insole is simply placed on the outsole, without attachment. In some embodiments, the insole may be placed in a shoe after the upper is attached to the outsole.

[0036] FIG. 6 illustrates the construction of a sole 600 using the example insole 100 and an outsole 602 according to embodiments of the disclosed technology. In the example of FIG. 6, the insole 100 may include a protuberance 606 of the foam 102 that extends downward through the hole 402 in the board 104, and below the lower surface of the board 104. In such embodiments, the outsole 602 may be formed to include a recess 604 to accommodate the protuberance 606. When the insole 100 is attached to the outsole 602, the protuberance 606

may be disposed within the recess 604 of the outsole 602. However, it should be understood that the recess 604 in the outsole 602 is not required. That is, in some embodiments, an insole 100 having a protuberance 606 may be used with an outsole 602 having no recess 604.

[0037] In some embodiments, the example process 300 of FIG. 3 may continue, to fabricate shoes using the example soles 600 of FIG. 6. Referring to FIG. 3, the process 300 may include attaching an upper to the sole 600, at 320. The upper may be fabricated and attached using conventional materials and processes. For example, the upper may be made of leather, and may be attached to the sole with glue, stitching, or the like, or combinations thereof.

[0038] FIG. 7 illustrates an example shoe 700 fabricated using the disclosed insole 100 featuring the recess 604 of the outsole 600 of FIG. 6 according to embodiments of the disclosed technology. Referring to FIG. 7, an upper 702 has been attached to the sole 600 of FIG. 6. Fabrication of the example shoe 700 may include other processes as well. For example, fabrication of the example shoe 700 may include the attachment of a heel 704. The fabrication of the example shoe 700 may include other conventional processes, for example such as the application of colors and protective coatings, the addition of decorative and functional elements, and the like.

[0039] FIG. 8 illustrates an example shoe 800 fabricated using the disclosed insole 100 and a sole with no recess according to embodiments of the disclosed technology. Referring to FIG. 8, the shoe 800 may include an insole comprising a board 104 having a hole, and foam 102 attached to the board 104, where the foam 102 protrudes through the hole in the board 104. The shoe 800 may include a metal shank 802, which may be located between the foam 102 and the board 104. The shoe 800 may include a sole 602, an upper 702, and a heel 704. In some embodiments, the shoe 800 is constructed such that the bottom of the upper 702 once lasted is at the same level as the bottom of the foam pad 102, as shown generally at 804.

[0040] As used herein, the term "or" may be construed in either an inclusive or exclusive sense. Moreover, the description of resources, operations, or structures in the singular shall not be read to exclude the plural. Conditional language, such as, among others, "can," "could," "might," or "may," unless specifically stated otherwise, or otherwise understood within the context as used, is generally intended to convey that certain embodiments include, while other embodiments do not include, certain features, elements and/or steps.

[0041] Terms and phrases used in this document, and variations thereof, unless otherwise expressly stated, should be construed as open ended as opposed to limiting. Adjectives such as "conventional," "traditional," "normal," "standard," "known," and terms of similar meaning should not be construed as limiting the item described to a given time period or to an item available as of a given time, but instead should be read to encom-

pass conventional, traditional, normal, or standard technologies that may be available or known now or at any time in the future. The presence of broadening words and phrases such as "one or more," "at least," "but not limited to" or other like phrases in some instances shall not be read to mean that the narrower case is intended or required in instances where such broadening phrases may be absent.

Claims

1. An insole for a shoe, the insole comprising:

a board having an upper surface, a lower surface, and a hole extending from the upper surface to the lower surface; and
a foam pad adhered to the upper surface of the board, the foam pad extending into the hole.

2. The insole of any of the preceding claims, wherein the foam protrudes through the hole, and below the lower surface of the board.

3. The insole of any of the preceding claims, wherein the foam adheres directly to the upper surface of the board.

4. The insole of any of the preceding claims, wherein the foam pad includes a plurality of second holes therethrough, the second holes being arranged near an edge of the hole in the board.

5. The insole of any of the preceding claims, wherein the foam pad comprises an open-cell polyether foam.

6. The insole of any of the preceding claims, wherein the hole is located where a ball of a wearer's foot would rest.

7. The insole of any of the preceding claims, wherein the foam pad includes a heel bump located where a heel of a wearer's foot would rest.

8. The insole of any of the preceding claims, wherein the foam pad comprises:
an arch support.

9. A sole for a shoe, the sole comprising:

the insole of any of the preceding claims; and
an outsole.

10. A shoe, comprising:

the insole of any of claims 1-8;
an outsole; and

an upper.

11. A process for making an insole for a shoe, the process comprising:

placing a board in a mold, the board having an upper surface, a lower surface, and a hole extending from the upper surface to the lower surface; and
injecting liquid foam onto the board such that the liquid foam flows into the hole.

12. The process of claim 11, further comprising:
injecting the liquid foam onto the board such that the liquid foam flows through the hole, and below the lower surface of the board.

13. The process of either of claims 11 and 12, wherein injecting the liquid foam onto the board comprises:
injecting the liquid foam directly onto the board.

14. The process of any of claims 11-13, further comprising:

closing the mold subsequent to injecting the liquid foam, wherein the liquid foam solidifies inside the mold;
opening the mold subsequent to closing the mold and subsequent to the liquid foam solidifying; and
removing the insole from the mold.

15. The process of any of claims 11-14, wherein the liquid foam comprises an open-cell polyether foam.

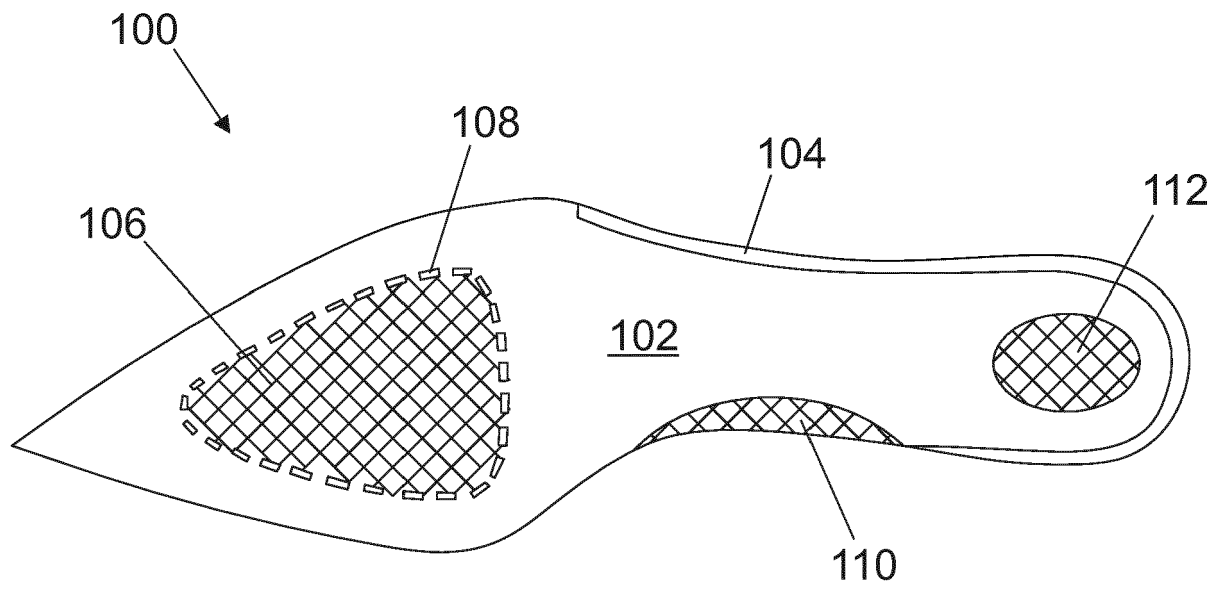


Fig. 1

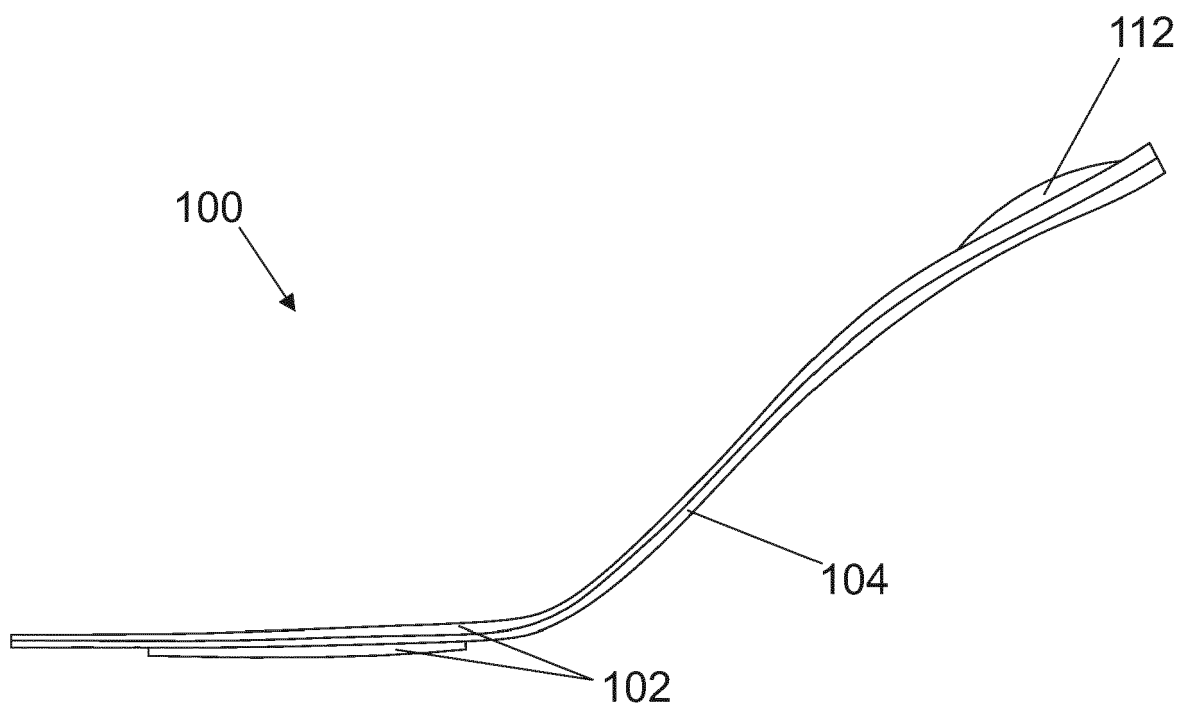


Fig. 2

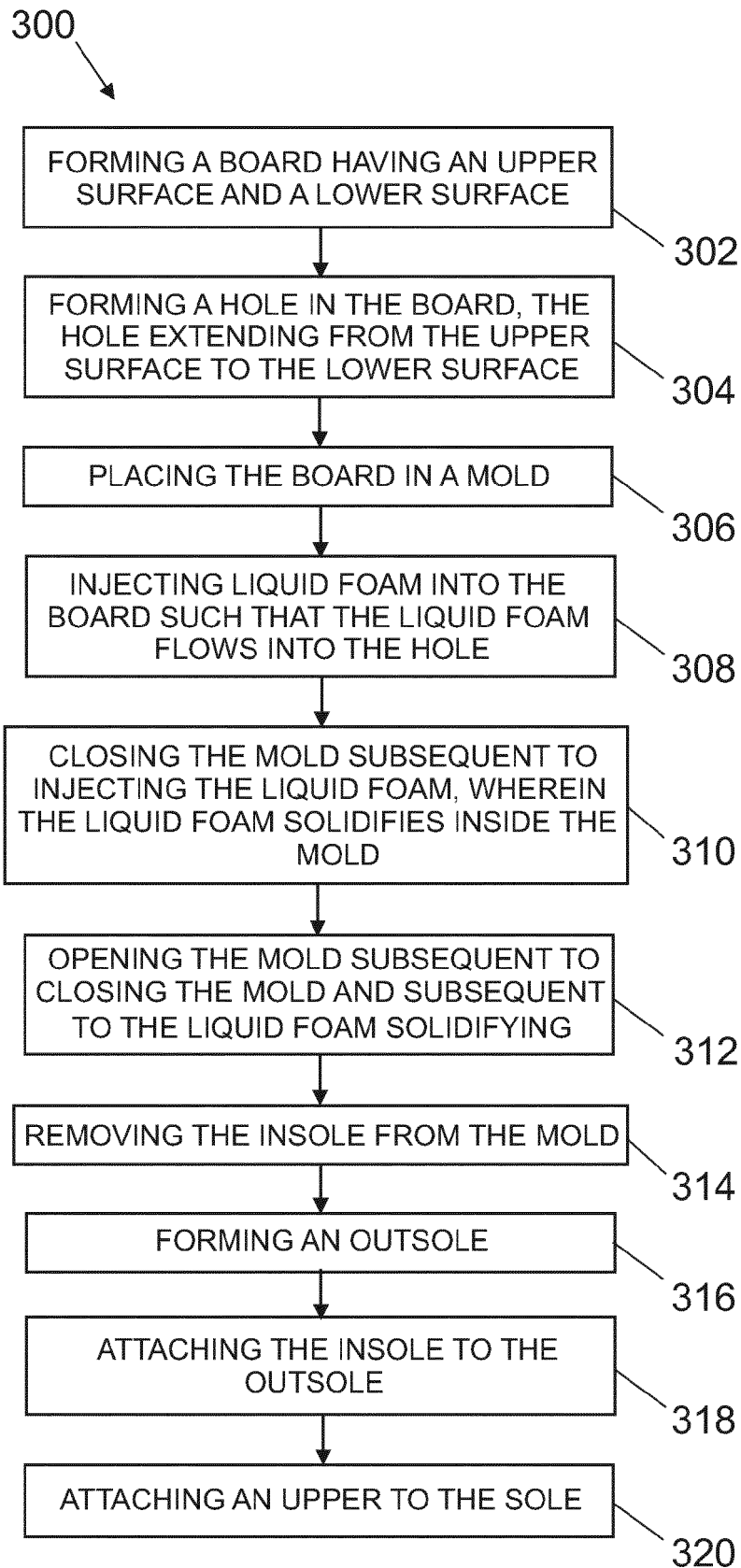


Fig. 3

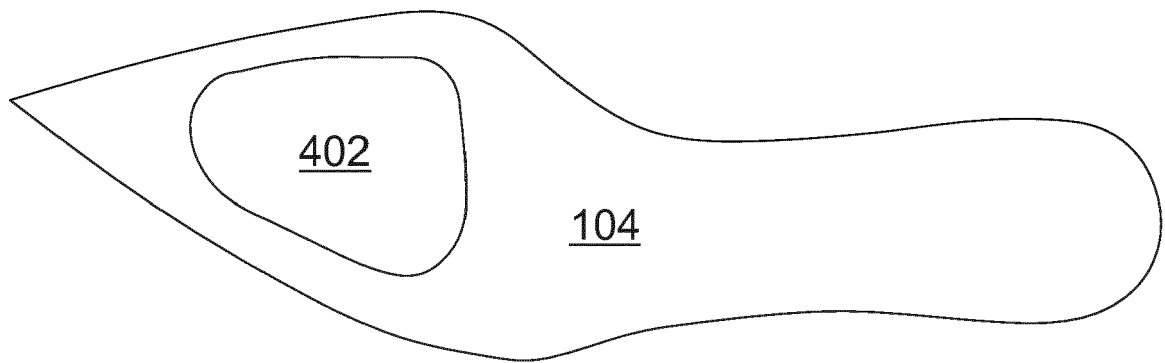


Fig. 4

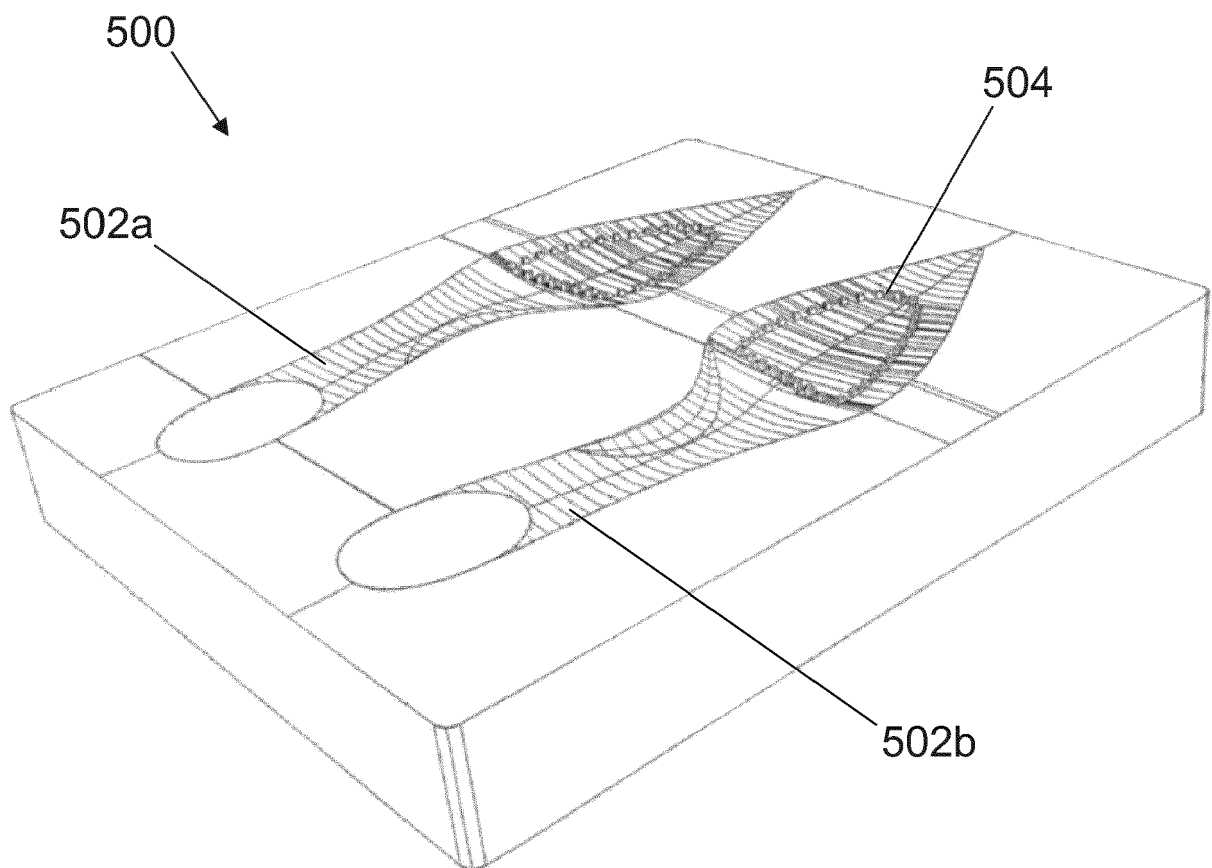


Fig. 5

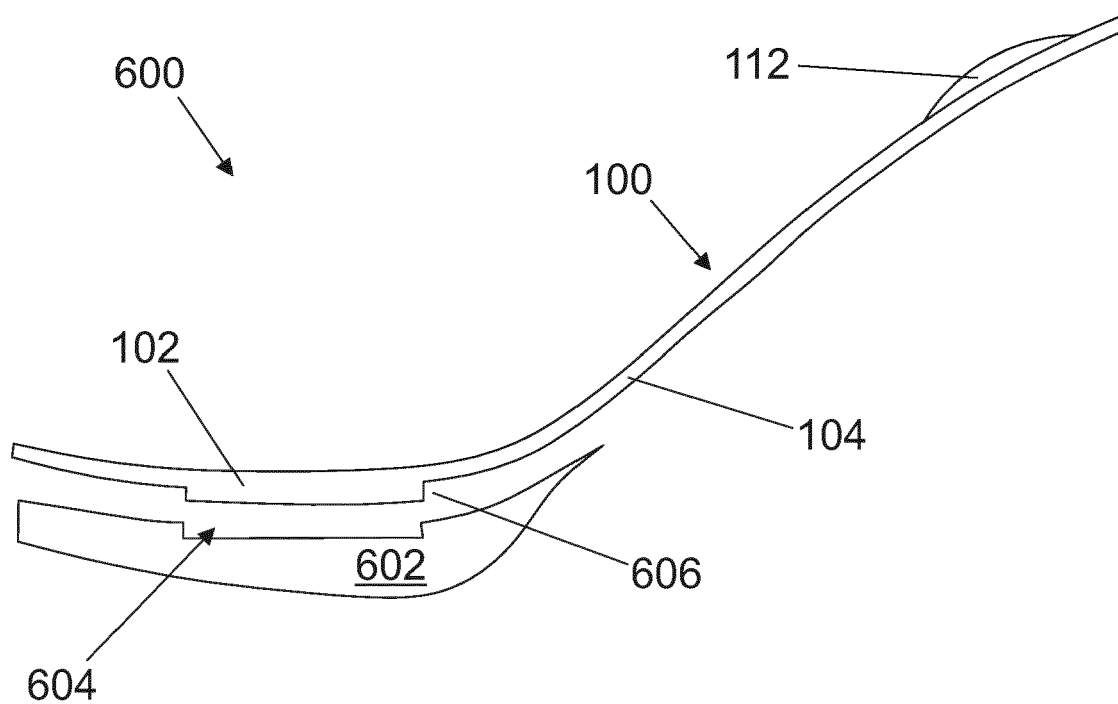


Fig. 6

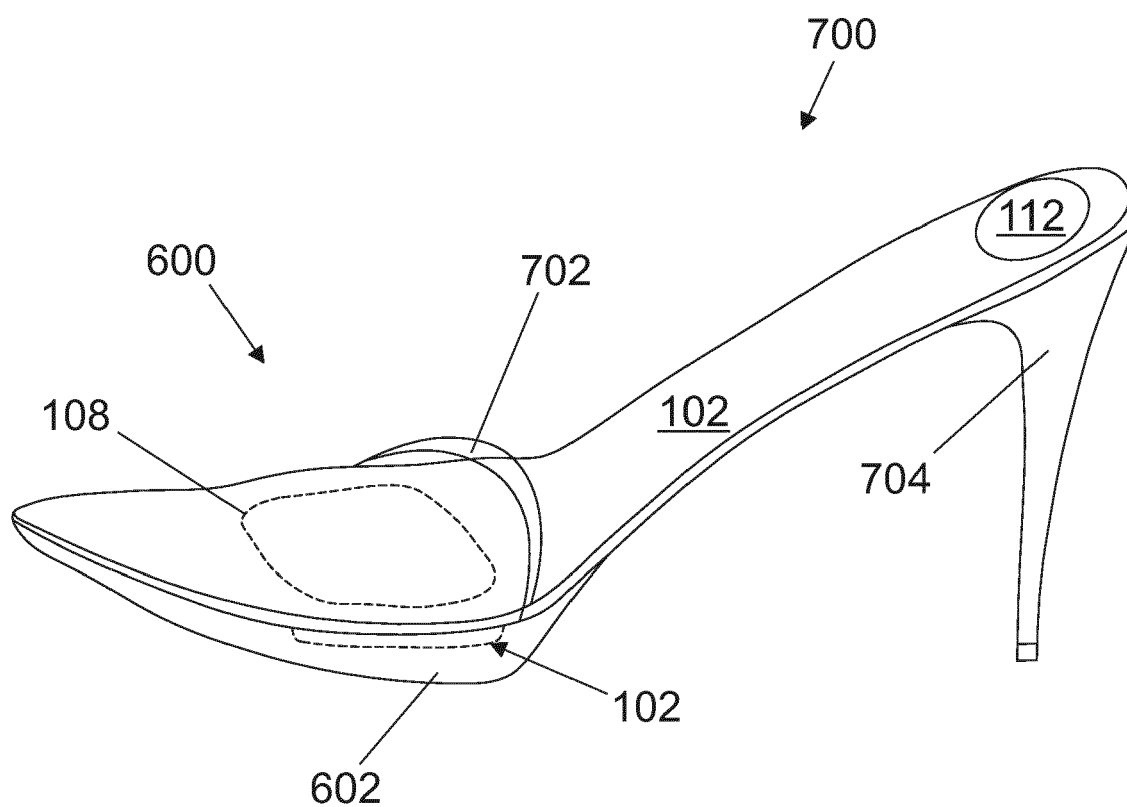


Fig. 7

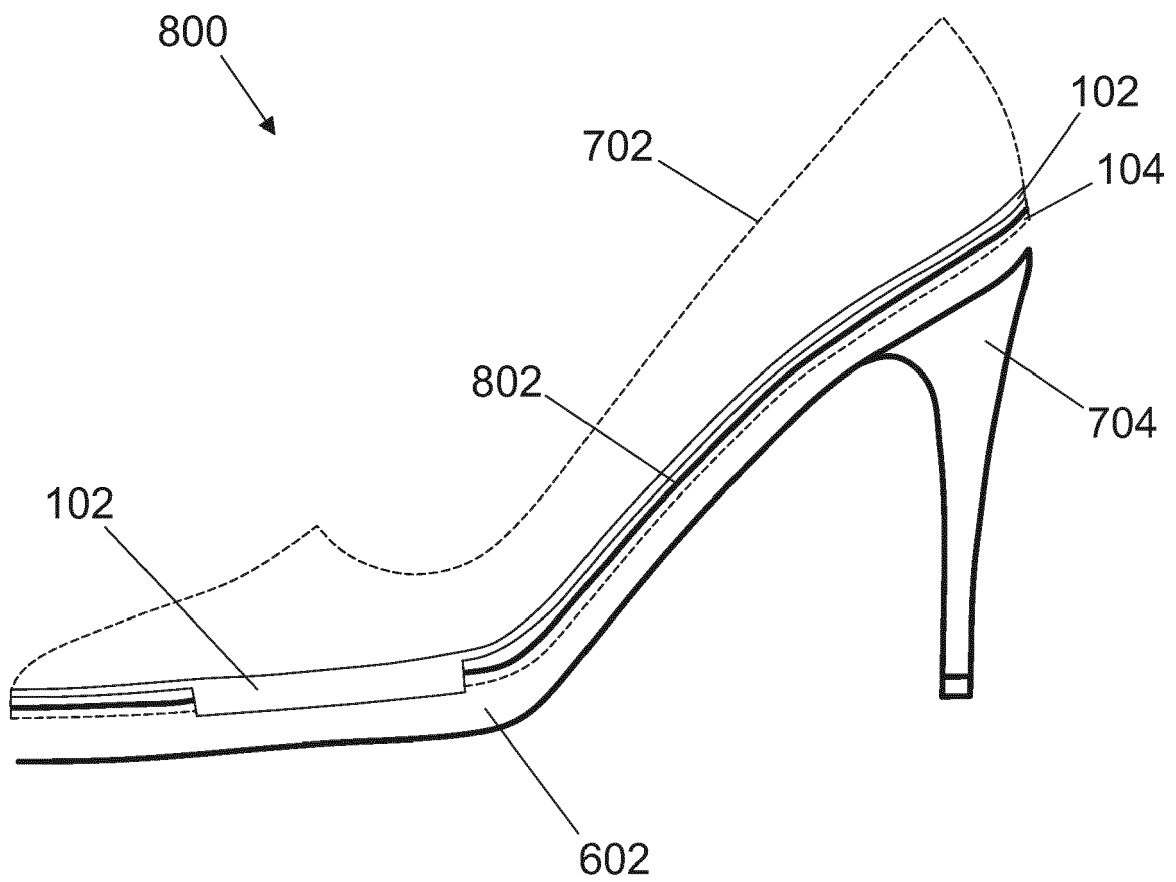


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 19 38 2740

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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