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**WO-A1-00/70982**
**WO-A1-2007/046118**
**US-A- 2 049 604**
**US-A- 5 285 583**
**US-B2- 7 444 766**

# DESCRIPTION

## TECHNICAL FIELD

**[0001]** The invention relates to an insole according to claim 1 to be used with a shoe, and a method of Strobel lasting a shoe.

## BACKGROUND

**[0002]** Shoes used in industrial environments, commonly referred to as safety shoes, must undergo demanding tests during to assure that the shoes comply with strict safety and endurance requirements.

**[0003]** As an example, the safety shoe is subjected to an automated test where a nail is pressed against an insole of the safety shoe to test whether the insole is capable of withstanding a nail pressure of about 1.1 kN without the nail penetrating the insole.

**[0004]** The insole is manufactured from a fibrous material, such as a thermoplastic, and needs to be at least partially flexible where the wearer' s mid foot ends and the front foot begins, since the insole should follow the outline of the wearer's foot when the wearer is waling or running.

**[0005]** A problem is that a flexible material capable of withstanding the nail pressure test discussed above is expensive. Materials withstanding such pressure include for instance Kevlar, Dyneema and Dyproflex.

**[0006]** An alternative to using these expensive materials for completely covering an underside of the insole in order to make the insole capable of withstanding the nail pressure test is to apply a so called shankboard (also referred to as a *gelenk*) to a section of the insole extending from the heel section over the mid foot section and ending where the mid foot section meets the front foot section.

**[0007]** The shankboard is rigid and stiff for providing stability to the wearer's foot and may for instance be manufactured from a plastic material. Hence, by applying a shankboard to the insole, a flexible material being capable of withstanding the nail pressure test is only required at the front foot section of the insole in front of the shankboard.

**[0008]** The single most common method of attaching an insole to an upper of a shoe before an outsole is mounted to the insole is the so called Strobel method. With the Strobel method the insole is stitched the upper, which is commonly referred to as *lasting.* Thereafter, the outsole is permanently attached to the insole, and the shoe is complete.

**[0009]** However, the Strobel method cannot by used with prior art shankboards as these shankboards are rigid and extends along the full width of the insole and thus cannot be stitched the upper. Being the most common used method when manufacturing shoes, this is a problem since the existing Strobel production lines cannot be utilized for this purpose.

**[0010]** US 7,444,766 discloses footwear including an insole of low density polyurethane and an integral border for attaching the insole to the upper and having an integral support surface for attaching a steel shank.

**[0011]** WO 00/70982 discloses a method of manufacturing an article of footwear including an insole having an upper face and a lower face, an upper secured to the insole, a penetration-resistant midsole, and a sole element moulded to the upper, said method including providing the insole with a retaining member and positioning the penetration-resistant midsole within the retaining member to be held in a retained position with respect to the insole.

**[0012]** US 2,049,604 discloses a sole equipped with a flexible steel plate for preventing the penetration of stones and other external objects far enough into the sole, when walking, to cause them to be felt by the foot; to provide a construction of sole in which the pressing of the sole down around the cleat or spike of an athletic shoe will not be transmitted inside the sole so as to cause discomfort to the wearer.

**SUMMARY**

**[0013]** An object of the present invention is to solve, or at least mitigate, the above given problem and thus provide an improved insole to be used with a shoe.

**[0014]** This object is attained in a first aspect of the invention by an insole according to claim 1 to be used with a shoe.

**[0015]** This object is attained in a second aspect of the invention by a method of Strobel lasting a shoe, according to claim 6.

**[0016]** Advantageously, by leaving a section of the insole free along the periphery of the insole, the insole can be stitched to an upper along its periphery.

**[0017]** In an embodiment , the shankboard is arranged to extend in a radial direction over a surface of the insole and end about 5 mm from the periphery of the insole. Standard piercing-resistance requirements stipulate that the insole must be piercing-resistant on a surface of the insole starting not more than 6 mm from the periphery. This embodiment advantageously ensures that these requirements are satisfied.

**[0018]** In yet an embodiment, the insole comprises a piercing-resistant member being

attached to an underside of the insole at a section of the insole where the shankboard ends, i.e. at the front foot section. Alternatively, the front foot section of the insole is manufactured from piercing-resistant material, even though that would imply a more complex manufacturing procedure.

**[0019]** Advantageously, by covering only a section of the insole with this piercing-resistant material, manufacturing cost of the insole may be greatly reduced, as these materials are expensive.

**[0020]** In a further embodiment, the piercing-resistant member is arranged to overlap the shankboard at a section of the insole where the shankboard ends and the piercing-resistant member starts. Thus, any gap created between the shankboard and the piercing-resistant member - where a sharp object potentially could pierce the insole - is advantageously avoided.

**[0021]** In an embodiment, the shankboard is manufactured from a material comprising one or more of plastic, leather or pressed cardboard, or any other appropriate rigid material.

**[0022]** In an embodiment, the piercing-resistant member is manufactured from a material comprising one or more of Kevlar, Dyneema or Dyproflex, or any other appropriate material being both piercing-resistant and flexible.

**[0023]** The objective stated in the above is further attained by a shoe comprising the insole.

**[0024]** In a further embodiment, a shoe is manufactured using the Strobel lasting method of the second aspect of the invention, where the method further comprises attaching a midsole and/or outsole to the lasted upper.

**[0025]** Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the element, apparatus, component, means, step, etc." are to be interpreted openly as referring to at least one instance of the element, apparatus, component, means, step, etc., unless explicitly stated otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

## BRIEF DESCRIPTION OF THE DRAWINGS

**[0026]** The invention is now described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates a safety shoe insole being subjected to a nail pressure test for testing piercing-resistance of the insole;

Figure 2 illustrates a prior art safety shoe insole being arranged with a shankboard;

Figure 3 illustrates use of the Strobel method for attaching an insole to an upper;

Figure 4 illustrates an insole according to an embodiment of the invention;

Figure 5 illustrates the insole of an embodiment having being stitched to an upper along a periphery of the insole;

Figure 6 illustrates yet a further embodiment where the insole comprises a piercing-resistant member attached to the insole;

Figure 7 illustrates a shoe comprising the insole according to embodiments of the invention; and

Figure 8 illustrates a flowchart of a method of Strobel lasting a shoe according to an embodiment of the invention.

## DETAILED DESCRIPTION

**[0027]** The invention will now be described more fully hereinafter with reference to the accompanying drawings, in which certain embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided by way of example so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout the description.

**[0028]** Figure 1 illustrates a safety shoe insole 10 being subjected to a nail pressure test for testing piercing-resistance of the insole 10. Thus, as previously has been discussed, a nail 11 is pressed (using an automated procedure) against an under side of the insole 10 to test whether the insole is capable of withstanding a nail pressure of about 1.1 - 1.2 kN without the nail 11 penetrating the insole 10.

**[0029]** Previous requirements have advocated that the nail 11 has a diameter of 4.5 mm tapering down to a diameter of 1 mm at its narrow end piercing the insole 10. New requirements are even stricter and advocate that the insole 10 should be able to withstand this pressure using a nail 11 having a diameter of 3 mm and 1 mm at its narrow end piercing the insole 10.

**[0030]** To withstand such a test, the insole 10 must either be manufactured from a piercing-resistant material, or alternatively the piercing-resistant material is attached to an underside of the insole 10. The material must further be flexible for allowing a wearer of a shoe (not shown) being equipped with the insole 10 to flex her foot when walking or running. Materials being both piercing-resistant and flexible, e.g. Kevlar, Dyneema or Dyproflex, are expensive.

**[0031]** Figure 2 illustrates a prior art safety shoe insole 10 being arranged with a so called shankboard 12 at a section of the insole 10 extending from the heel section over the mid foot section and ending where the mid foot section meets the front foot section.

**[0032]** The shankboard 12 is rigid and stiff for providing stability to the wearer's foot and may for instance be manufactured from leather, pressed cardboard, or a plastic material. Hence, by attaching the shankboard 12 to the insole 10, a flexible material being capable of withstanding the nail pressure test is only required at the front foot section of the insole 10, where the shankboard 12 ends.

**[0033]** Figure 3 illustrates the use of the so called Strobel method for attaching the insole 10 to an upper 13. With the Strobel method, the insole 10 is stitched along its periphery 14 to the upper 13 before an outsole (not shown) is mounted to the insole 10 and the upper 13 and the shoe is complete.

**[0034]** As previously has been described, a problem in the art is that the Strobel method cannot be used then the insole 10 is to be equipped with a shankboard 12.

**[0035]** Figure 4 illustrates an insole 20 according to an embodiment of the invention. The insole 20 of the embodiment is equipped with a shankboard 21 being attached to an underside of the insole 20.

**[0036]** The shankboard 21 is advantageously arranged to extend over a surface of the insole 20 leaving a section 22 along a periphery 23 of the insole 20 free, thereby enabling Strobel lasting of the insole 20 to an upper (not shown) for manufacturing a safety shoe,

**[0037]** Figure 5 illustrates the insole 20 of an embodiment having being stitched to an upper 24 along the periphery 23 of the insole 20. The free section 22 enables stitching of the insole 20 to the upper 24 along the complete periphery 23 of the insole 20.

**[0038]** In an embodiment , the shankboard is arranged to extend in a radial direction over the surface of the insole 20 and end about 5 mm from the periphery 23 of the insole. Standard piercing-resistance requirements stipulate that the insole 20 must be piercing-resistant on a surface of the insole 20 starting not more than 6 mm from the periphery 23.

**[0039]** This embodiment advantageously ensures that these requirements are satisfied.

**[0040]** Figure 6 illustrates yet a further embodiment, where the insole 20 comprises a piercing-resistant member 25 being attached to an underside of the insole 20 at a section of the insole where the shankboard 21 ends, i.e. at the front foot section. Alternatively, the front foot section of the insole 20 is manufactured from piercing-resistant material, even though that would imply a more complex manufacturing procedure.

**[0041]** Further with reference to Figure 6, in an embodiment, the piercing-resistant member 25 is advantageously arranged to overlap the shankboard 21 at a section of the insole 20 where the shankboard 21 ends and the piercing-resistant member 25 starts. Thus, any gap created between the shankboard 21 and the piercing-resistant member 25 - where a sharp object potentially could pierce the insole 20 - is avoided.

**[0042]** In an embodiment, the shankboard 21 is manufactured from a material comprising one or more of plastic, leather or pressed cardboard, or any other appropriate rigid material.

**[0043]** In an embodiment, the piercing-resistant member 25 is manufactured from a material comprising one or more of Kevlar, Dyneema or Dyproflex, or any other appropriate material being both piercing-resistant and flexible.

**[0044]** Figure 7 illustrates a shoe 30 comprising the insole 20 according to embodiments of the invention. Hence, the insole 20 is arranged with a shankboard 21 and potentially also a piercing-resistant member 25. The insole 20 is stitched to the upper 24 of the shoe 30 using Strobel lasting as previously has been discussed. A thin inlay sole 31 is placed on top of the insole 20. The underside of the insole 20 is enclosed by a midsole 32 of the shoe, which further may be arranged with an outsole 33.

**[0045]** Figure 8 illustrates a flowchart of a method of Strobel lasting a shoe according to an embodiment. The method comprises, in step S101, attaching a shankboard 21 to an insole 20, the shankboard 20 being arranged to partially extend over a surface of the insole 20 leaving a section 22 along a periphery 23 of the insole 20 free. Thereafter, in step S102, the insole 20 is stitched to an upper 24 of the shoe along the periphery 23 of the insole 20. After these steps have been undertaken, an outsole or midsole 32 can be attached to the lasted upper 24.

**[0046]** The invention has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended patent claims.

# REFERENCES CITED IN THE DESCRIPTION

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**Patent documents cited in the description**

- US7444766B **[0010]**
- WO0070982A **[0011]**
- US2049604A **[0012]**

**Patentkrav**

**1.** Bindsål (20) til at bruge med en sko, omfattende:
en skoplade (21) fastgjort til bindsålen (20), idet skopladen (20) er anbragt, så den delvist strækker sig over en flade af bindsålen (20), idet et afsnit (22) langs en periferi (23) af bindsålen (20) lades frit, hvorved Strobel-konstruktion af bindsålen (20) til en overdel (24) af skoen muliggøres, idet skopladen (21) strækker sig i længderetningen langs bindsålens (20) overflade fra et hælafsnit til et forfodsafsnit; idet bindsålen (20) er **kendetegnet ved** desuden at omfatte:
et sømværnselement (25) anbragt til kun at overlappe med skopladen (21) i forfodsafsnittet af bindsålen (20), hvor skopladen (21) ender, og sømværnselementet (25) starter.

**2.** Bindsål (20) ifølge krav 1, idet skopladen (21) er anbragt, så den strækker sig over en flade af bindsålen og ender omkring 5 mm fra periferien af bindsålen.

**3.** Bindsål (20) ifølge et hvilket som helst af de foregående krav, hvor skopladen (21) er fremstillet af et materiale omfattende en eller flere af læder, presset pap eller plast.

**4.** Bindsål (20) ifølge krav 2, hvor sømværnselementet (25) er fremstillet af et materiale omfattende en eller flere af Kevlar, Dyneema eller Dyproflex.

**5.** Sko (30) omfattende bindsålen (20) ifølge et hvilket som helst af de foregående krav.

**6.** Fremgangsmåde med Strobel-konstruktion af skoen (30) ifølge krav 5, omfattende:

fastgørelse (S101) af skopladen (21) til bindsålen (20), idet skopladen (20) anbringes til delvist at strække sig over en flade af bindsålen (20), idet et afsnit (22) langs en periferi (23) af bindsålen (20) lades frit; og

syning (S102) af bindsålen (20) til en overdel (24) af skoen langs periferien (23) af bindsålen (20).

# DRAWINGS

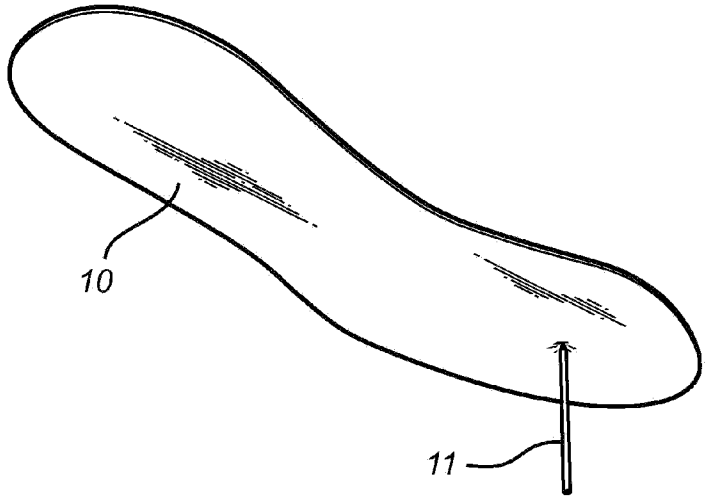


Fig. 1

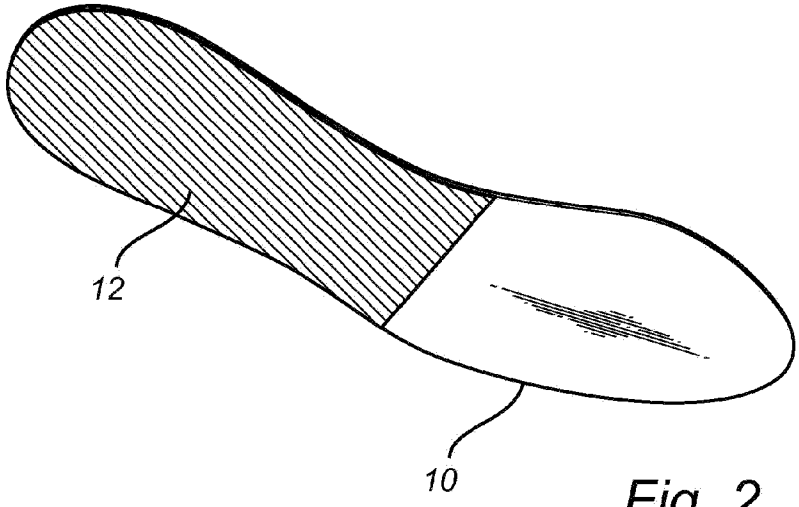


Fig. 2

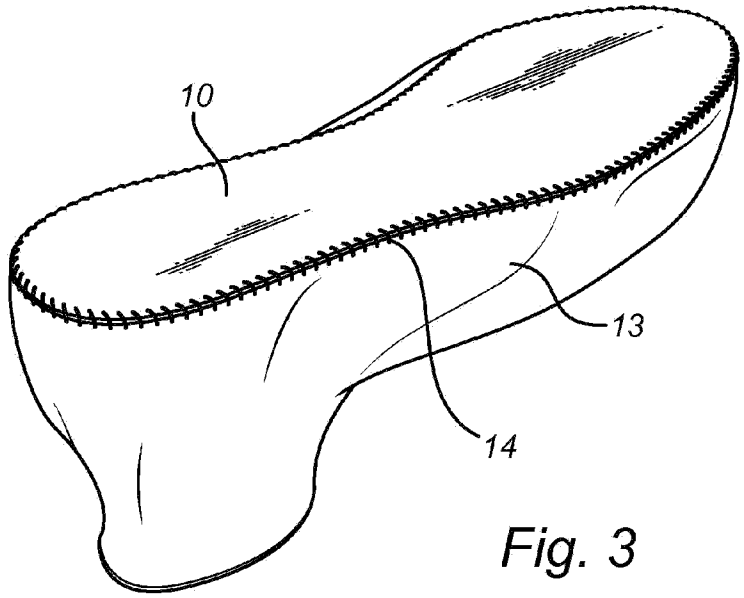


Fig. 3

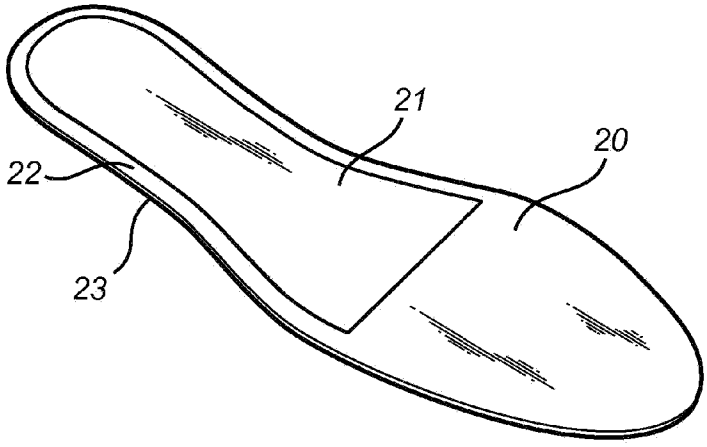


Fig. 4

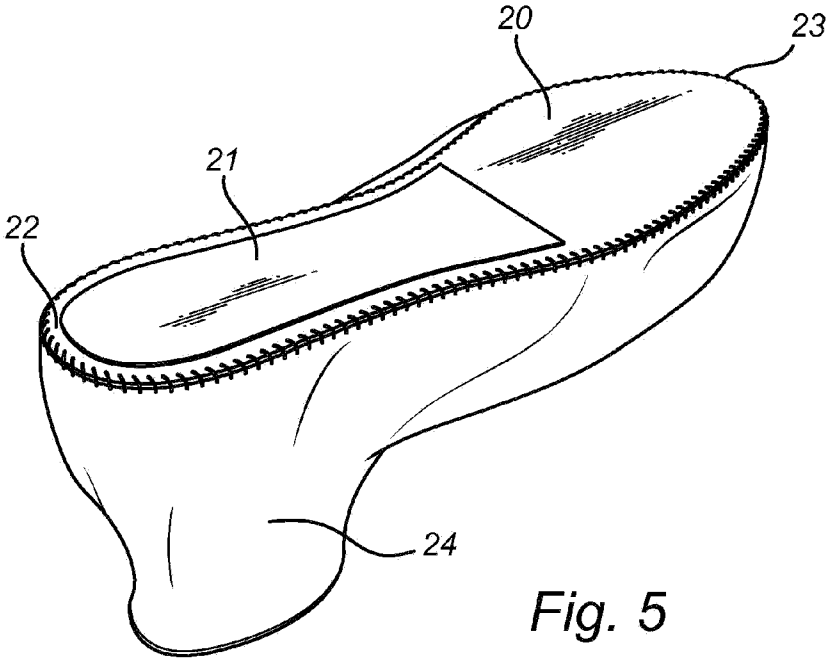


Fig. 5

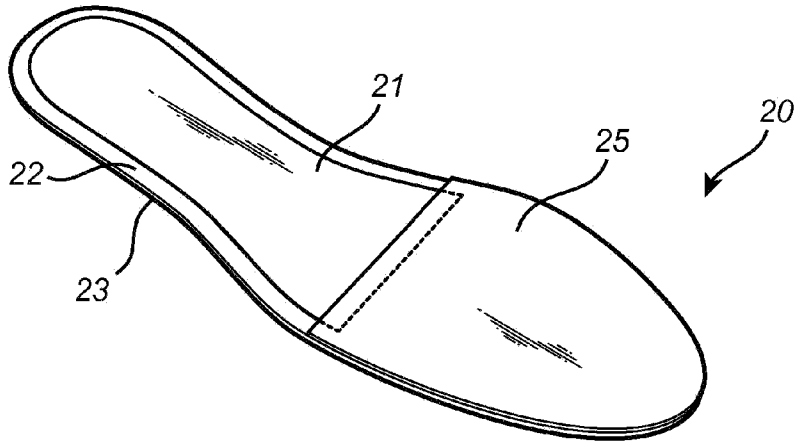


Fig. 6

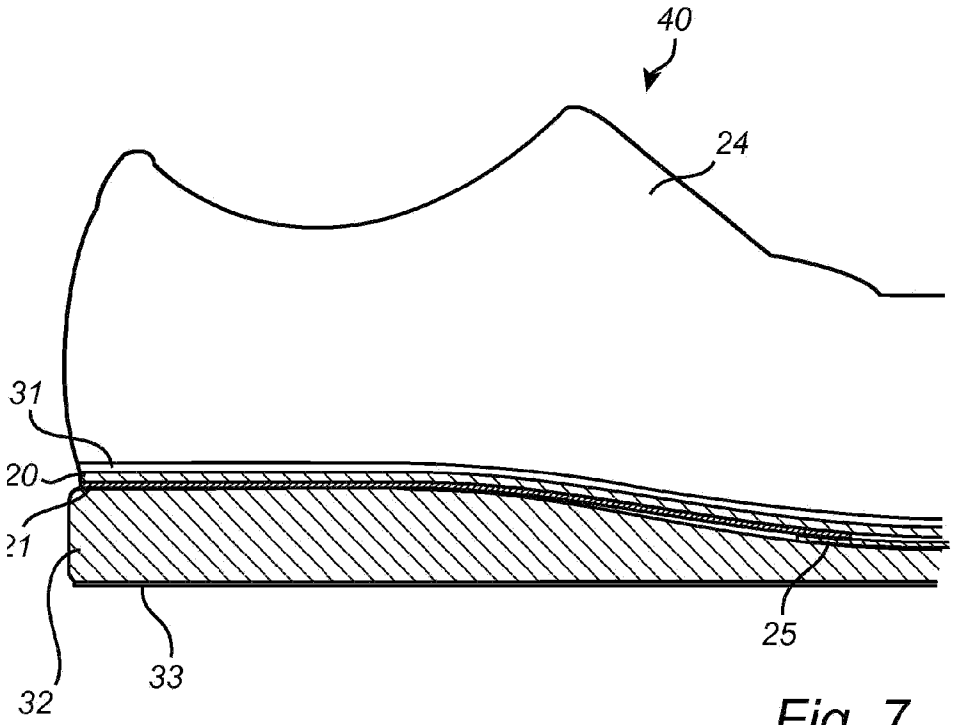
40
24
31
20
21
32
33
25

Fig. 7

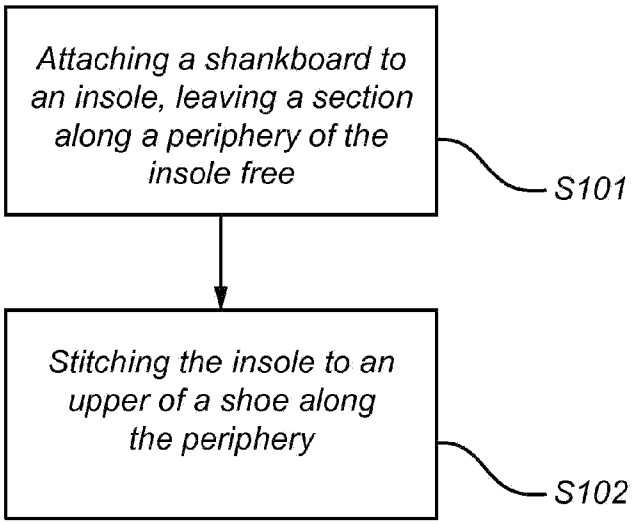
Attaching a shankboard to an insole, leaving a section along a periphery of the insole free
S101
Stitching the insole to an upper of a shoe along the periphery
S102

Fig. 8