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(54) **Footbed section**

(57) There is disclosed a footbed section 15 for use in an article of footwear. The footbed section has resilient upper and lower laminar members 17, 16, the lower member being formed from a material which is harder than the material of the upper member. The lower member 16 has a number of upward projections 18 in the midfoot

region, which projections 18 mate with corresponding holes 19 in the upper member 17. Downward compression of the footbed section 15 during walking causes the projections 18 to project upwardly above or more above the upper surface 21 of the upper member 17 than when uncompressed.

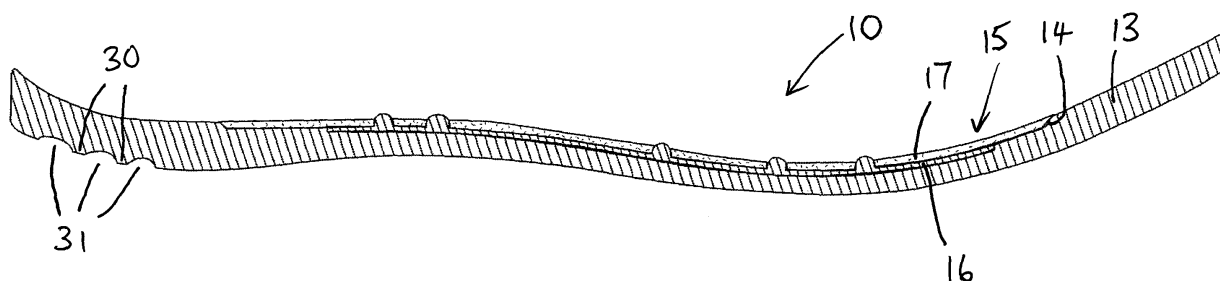


FIGURE 2

Description

[0001] The present invention relates to a footbed section for use in the sole portion of an article of footwear and to a footbed or an article of footwear incorporating such a footbed section.

[0002] According to a first aspect of the present invention there is provided a footbed section for use in the sole portion of an article of footwear, the footbed section comprising a resilient lower laminar member associated with a resilient upper laminar member, the lower member being formed from a material which is harder than the material of the upper member wherein the lower member has a number of upward projections in the midfoot region, each projection extending through a corresponding hole provided in the upper member such that downward compression of the footbed section causes the projections to project upwardly above or more above the upper surface of the upper member than when uncompressed.

[0003] Often, the top of the projections are generally flush with the upper surface of the upper member.

[0004] According to a second aspect of the present invention there is provided a footbed section for use in the sole portion of an article of footwear, the footbed section comprising a resilient lower laminar member associated with a resilient upper laminar member, the lower member being formed from a material which is harder than the material of the upper member wherein the lower member has a number of upward projections in the midfoot region, such that downward compression of the footbed section causes the parts of the upper member around the projections to depress more than the parts of the upper member directly above the projections whereby the parts of the upper member above the projections project upwardly above or more above the other parts of the upper member than when uncompressed.

[0005] In preferred arrangements each projection is generally cylindrical. Preferably each projection has a rounded top end. Often the projections all have the same lateral cross-sectional area and also when uncompressed.

[0006] With preferred embodiments the lower member is made from TPU and the upper member is made from EVA.

[0007] According to a third aspect of the present invention there is provided a footbed incorporating a footbed section as described above, the footbed section being secured to the upper side of a footbed element.

[0008] Ideally the footbed section is received in a correspondingly shaped recess in the footbed element. Normally the footbed element is foot-shaped so as to provide support beneath the whole of the foot of the user.

[0009] It is a preferred feature that the projections of the footbed section are provided only in the midfoot region and not in the toe and heel regions.

[0010] In some arrangements the underside of the footbed element is recessed at its outside edge in the toe region. Also in some preferred arrangements the un-

derside of the footbed element has a plurality of laterally extending grooves in the heel region such that the underside has a serpentine profile in lengthwise cross-section in the heel region.

[0011] Often the footbed element is made from SEBS.

[0012] According to a fourth aspect of the present invention there is provided an article of footwear incorporating a footbed section as described above, the article of footwear having an upper and a sole unit wherein the footbed section is received in a recess provided in the upper surface of the sole unit.

[0013] According to a further aspect of the present invention there is provided a footbed for an article of footwear, the underside of the footbed being recessed at its outside edge in the toe region.

[0014] Embodiments of the present invention will now be described in more detail. The description makes reference to the accompanying drawings in which:

Figure 1 is a perspective view from above a footbed incorporating a footbed section according to the present invention,

Figure 2 is a lengthwise vertical section through the footbed shown in figure 1,

Figure 3 is a perspective view from below the footbed of figure 1,

Figure 4 is a lengthwise vertical section through a sole unit incorporating the footbed of figure 1,

Figure 5 is a view similar to figure 4 but partially exploded to show the components of the footbed section,

Figure 6 is a lateral section through the footbed of figure 1 when subjected to a downward compressive force,

Figure 7 is a lateral section similar to figure 6 when there is no downward compressive force,

Figure 8 is a lateral section through an alternative footbed when subjected to a downward compressive force, and

Figure 9 is a lateral section similar to figure 8 when there is no downward compressive force.

[0015] In the figures there is shown a footbed 10 for use in an article of footwear comprising an upper (not shown) and an outer sole 11 which may have a tread pattern 12 in its lowermost surface. The footbed 10 comprises a footbed element 13 which is generally foot shaped for insertion into the article of footwear. In the upper surface of the footbed element 13 is a recess 14 in the midfoot area and in the recess 14 is provided a footbed section 15, which footbed section 15 encapsulates the present invention in its most basic form as will be discussed later. The footbed element is typically flexible with a degree of resilience and may be made from one of a number of conventional footbed materials such as SEBs (Styrene-Ethylene-Butylene-Styrene block copolymer).

[0016] The footbed section 15 comprises two generally

laminar components, a lower member 16 and an upper member 17 which overlies the lower member 16. Both members 16, 17 are formed from a resilient material such as natural or synthetic rubber. The material of the upper member 17 is softer than the material of the lower member in that it is more compressible when subjected to a downward force exerted by a wearer's foot during the walking cycle. In particular, favourable results have been achieved when the upper member 17 has been made from an EVA (Ethylene Vinyl Acetate) and the lower member 16 has been made from a TPU material (Thermoplastic Polyurethane).

[0017] The lower member 16 is formed with a number of upwardly projecting projections 18 in a midfoot region of the footbed 10 but preferably not in the toe and heel regions of the footbed. The upper member 17 is formed with a corresponding number of holes 19 through its thickness at locations which correspond to the locations of the projections 18 such that, when the upper member 17 overlies the lower member 16, the projections 18 are received in the holes 19.

[0018] The two laminar members 16, 17 therefore lie next to each other with the projections 18 and the holes 19 mating. It will be appreciated that the combination will almost certainly not be flat but will be somewhat contoured as is common with footbeds. It is also clear from figure 5 that the recess 14 in the footbed element 13 is in fact a two stage recess with the lowermost part of the recess 14 accommodating the lower member 16 and the upper part of the recess 14 having a greater area for accommodating the upper member 17 whose marginal portions forwards and rear extend beyond the lower member 16 (although this is not essential to the basic invention).

[0019] In the illustrated embodiments, each projection 18 is generally circular cylindrical in the upward direction with a rounded top 20 at its upper extremity, remote from the laminar part of the lower member 16. In addition, all of the projections 18 are of the same size. It will be appreciated that in other embodiments the projections 18 could be of different shapes, sizes and heights and their parameters may vary in a lower member 16 depending on the desired effect. For example, in one effective embodiment the projections 18 are 3.1mm high and 4mm in diameter but it is envisaged that the projections could be between 2 to 6mm high and between 2 to 7mm in diameter. The height of the projections is of course related to the thickness of the upper member 17 and other dimensions may be possible.

[0020] The action of the footbed 10, and in particular the footbed section 15, when in place in an article of footwear will now be described in more detail. Figures 6 and 7 best illustrate the action. During the walking cycle the footbed 10 is subjected to a repeating downward compressive force due to the weight of the wearer passing down through the foot of the wearer. This force causes the footbed section 15 to resiliently compress and then return to its 'at rest' configuration as shown in figure 7

when the force is removed, i.e. when the article of footwear is not bearing the weight of wearer.

[0021] In this embodiment, when the footbed section 15 is in its 'at rest' condition shown in figure 7, the rounded tops 20 of the projections 18 only just project above the upper surface 21 of the upper member 17 although this level of projection could be greater or smaller as desired.

[0022] When the footbed section 15 is compressed, as shown in figure 6, the upper and lower members 16, 17 compress resiliently in the vertical direction as to an extent does the footbed element 13, but the upper member 17 compresses more relative to the lower member 16 which results in the projections 18 projecting above the upper surface 21 more than in the 'at rest' condition. After the compressive force is removed then the footbed 10 resiliently returns to the 'at rest' condition of figure 7.

[0023] It has been found that the projections 18, when the footbed element 13 is in its compressed condition, engage the foot of the wearer to a greater degree than when in the 'at rest' condition and this greater engagement can stimulate the midfoot region of the foot to help blood flow thereby increasing the benefit to the legs and comfort for the foot when static and during walking. The engagement can also have reflexology use and can provide controlled cushioning. In all cases, the level of the effect can be altered by using an element which has softer or harder materials of manufacture or has a different pattern/configuration/size of projections.

[0024] Figures 8 and 9 show a footbed arrangement which incorporates an alternative footbed section 39. Instead of the projections 18 projecting through holes 19 in the upper member 17 the projections simply nest in recesses 40 in the underside of the upper member 17. The upper surface 41 of the upper member 17 remains uninterrupted in that there are no through holes 19. In some embodiments the upper member 17 simply sits on top of the lower member 16 whereas in other embodiments the upper and lower members 16, 17 could be secured together. Alternatively, the upper member 17 could be moulded over the lower member 16.

[0025] When the footbed section 39 is uncompressed the part 42 of the upper member 17 directly above each projection may be flush with the surrounding parts 43 of the upper member 17. The parts 42 could however project slightly above the parts 43 when no downward force is applied to the footbed section 39. When the footbed section 39 is subjected to a downward compressive force during walking, the upper member 17 is compressed more than the lower member 16 such that the parts 42 above the projections are caused to project further above the parts 43 between the projects. This results in similar effects to those provided by the arrangement described above in relation to figures 1 to 7. Instead of the projections 18 making direct contact with the foot of the wearer, there is a thin layer of the upper member 17 between the projections 18 and the foot. Again, after the compressive force is removed during foot lift, the footbed section returns resiliently to the figure 9 configuration.

[0026] The underside of the footbed 10 also has a recessed area 25 at its outside edge in the toe region. The recessed area 25, or metatarsal indent, has a generally arcuate inside edge 26 and is disposed generally below the 5th metatarsal or toe when in use. This feature helps correct the biomechanical movement of the wearer's foot during the walking cycle. During the walking cycle there is heel placement followed by a general flat placement of the whole foot which is then followed by the push off by the toes. Ideally, before the push off phase the foot should roll on the 5th metatarsal through to the 1st metatarsal before the push off. The metatarsal indent 25 helps in the initiation of this rolling action from the 5th to the 1st metatarsal.

[0027] In addition, the underside of the footbed 10 also has a number of lateral ridges 30 and grooves 31 below the heel area such that in lengthwise cross-section, and indeed in side view, the lower profile of the footbed 10 undulates in a generally serpentine manner. These ridges/grooves 30, 31 assist the foot movement as the foot rolls forward during the walking action and help to control against pronation or supination movements.

[0028] It will be appreciated that the precise shape and depth of the recessed area 25 and shape and number of the ridges/grooves 30, 31 is a matter of design choice and will depend on the level of effect or assistance required.

Claims

1. A footbed section for use in the sole portion of an article of footwear, the footbed section comprising a resilient lower laminar member associated with a resilient upper laminar member, the lower member being formed from a material which is harder than the material of the upper member wherein the lower member has a number of upward projections in the midfoot region, each projection extending through a corresponding hole provided in the upper member such that downward compression of the footbed section causes the projections to project upwardly above or more above the upper surface of the upper member than when uncompressed.
2. A footbed section as claimed in claim 1 wherein, when uncompressed, the top of the projections are generally flush with the upper surface of the upper member.
3. A footbed section for use in the sole portion of an article of footwear, the footbed section comprising a resilient lower laminar member associated with a resilient upper laminar member, the lower member being formed from a material which is harder than the material of the upper member wherein the lower member has a number of upward projections in the midfoot region, such that downward compression of the footbed section causes the parts of the upper member around the projections to depress more than the parts of the upper member directly above the projections whereby the parts of the upper member above the projections project upwardly above or more above the other parts of the upper member than when uncompressed.
4. A footbed section as claimed in any one of claims 1 to 3 wherein each projection is generally cylindrical.
5. A footbed section as claimed in any one of claims 1 to 4 wherein each projection has a rounded top end.
6. A footbed section as claimed in any one of claims 1 to 5 wherein the projections all have the same lateral cross-sectional area.
7. A footbed section as claimed in any one of claims 1 to 6 wherein the lower member is made from TPU.
8. A footbed section as claimed in any one of claims 1 to 7 wherein the upper member is made from EVA.
9. A footbed incorporating a footbed section as claimed in any one of claims 1 to 8 wherein the footbed section is secured to the upper side of a footbed element.
10. A footbed section as claimed in claim 9 wherein the footbed section is received in a correspondingly shaped recess in the footbed element.
11. A footbed section as claimed in claim 9 or claim 10 wherein the footbed element is foot-shaped so as to provide support beneath the whole of the foot of the user.
12. A footbed as claimed in claim 11 wherein the projections of the footbed section are provided only in the midfoot region and not in the toe and heel regions.
13. A footbed as claimed in any one of claims 9 to 12 wherein the underside of the footbed element is recessed at its outside edge in the toe region.
14. A footbed as claimed in any one of claims 9 to 13 wherein the underside of the footbed element has a plurality of laterally extending grooves in the heel region such that the underside has a serpentine profile in lengthwise cross-section in the heel region.
15. A footbed as claimed in any one of claims 9 to 14 wherein the footbed element is made from SEBS.
16. An article of footwear incorporating a footbed section as claimed in any one of claims 1 to 8 wherein the article of footwear has an upper and a sole unit wherein the footbed section is received in a recess

provided in the upper surface of the sole unit.

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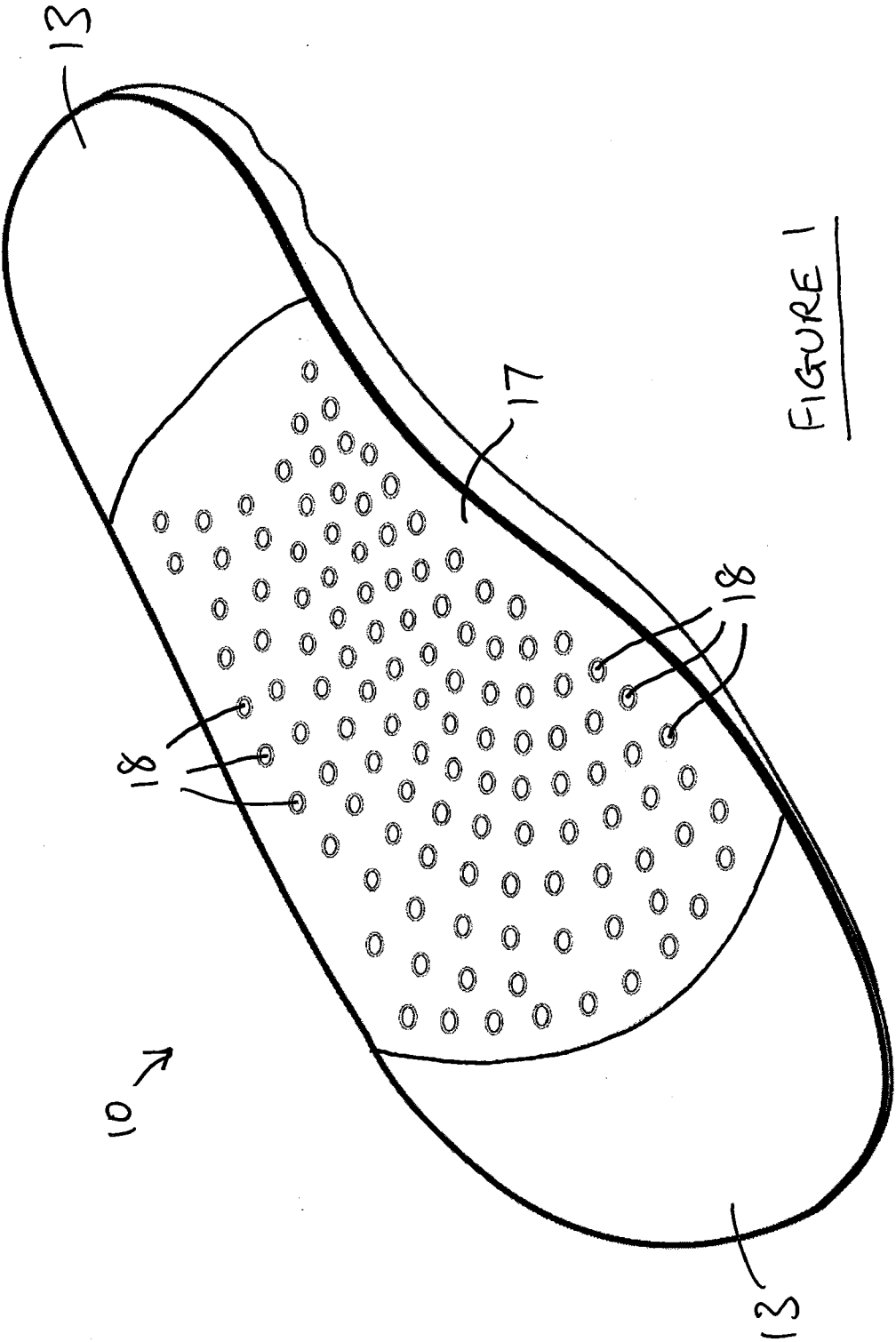


FIGURE 1

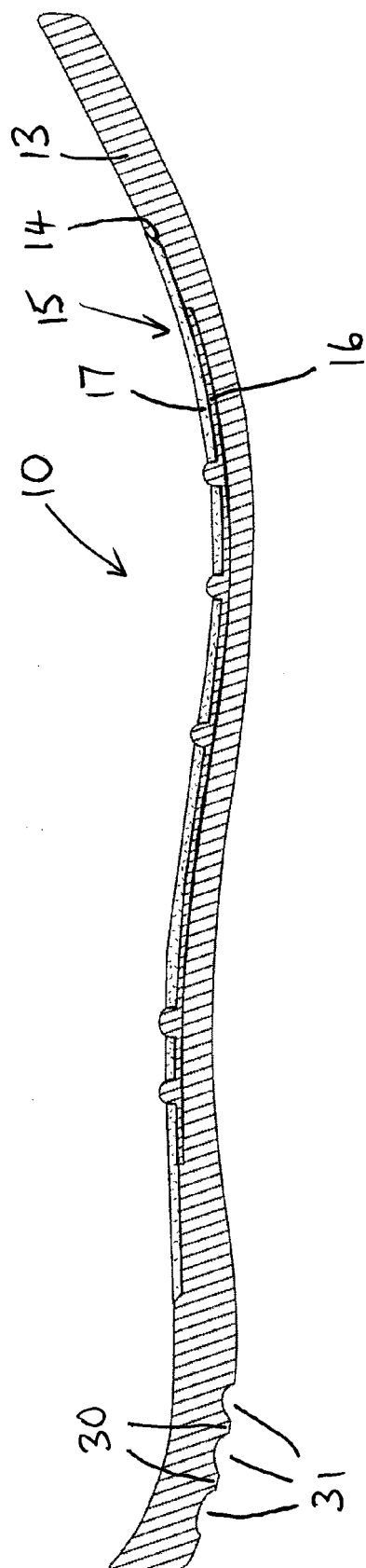


FIGURE 2

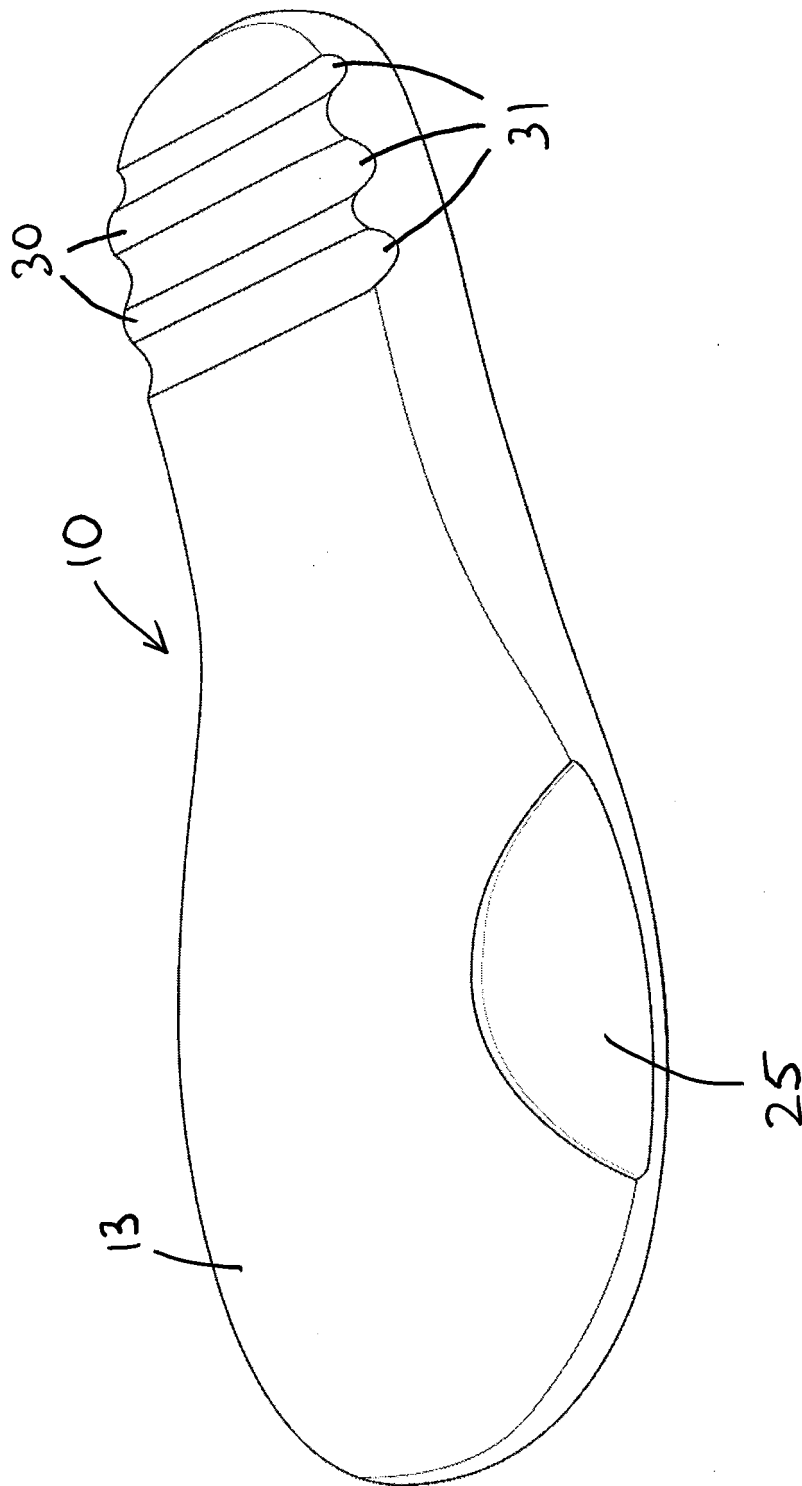


FIGURE 3

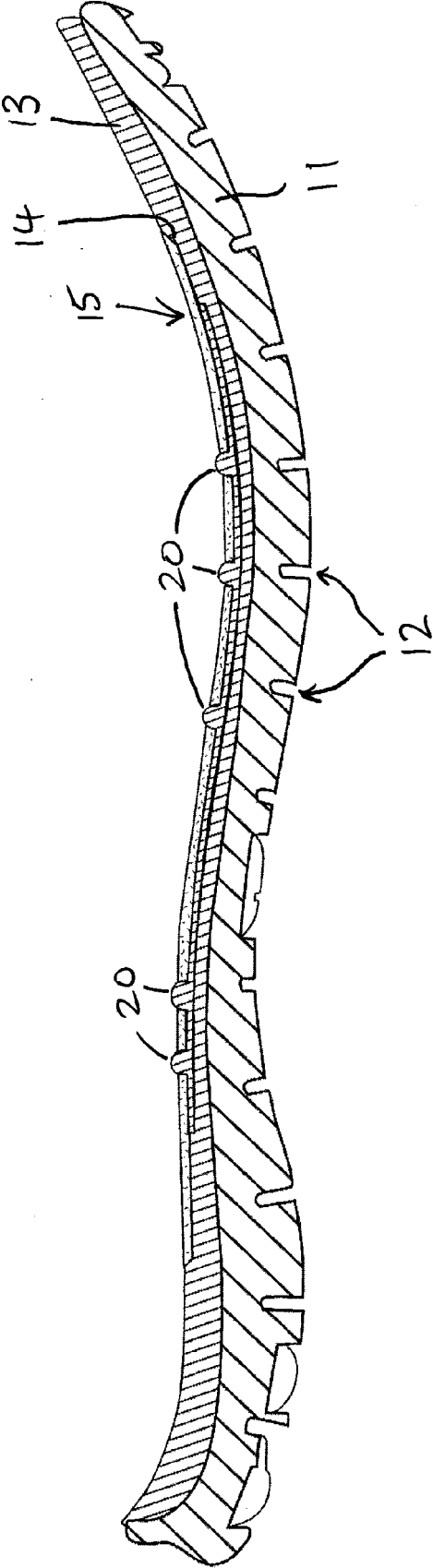


FIGURE 4

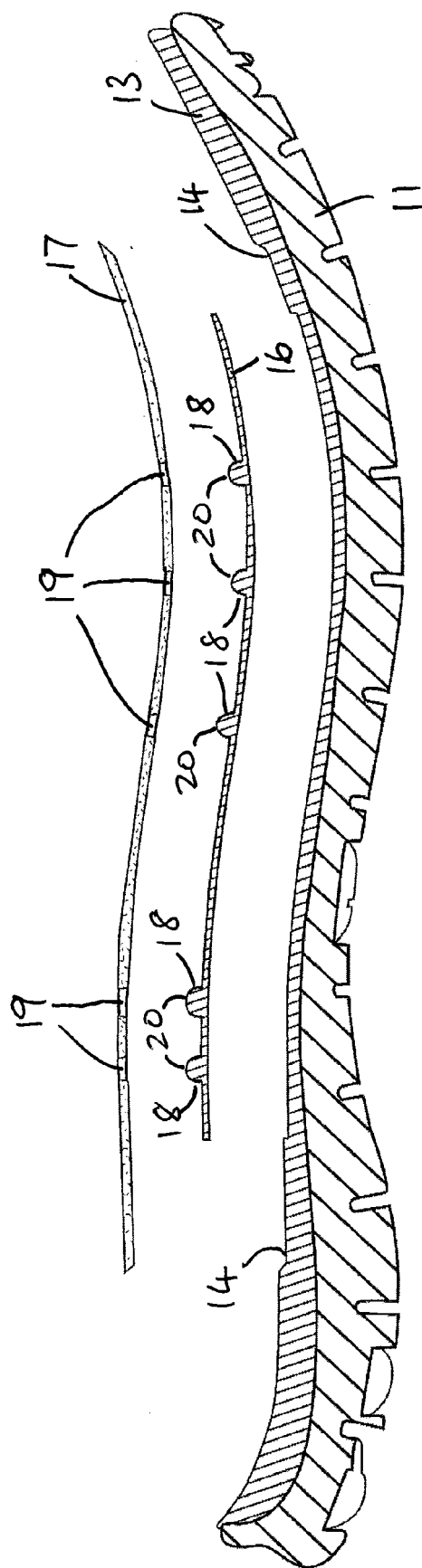


FIGURE 5

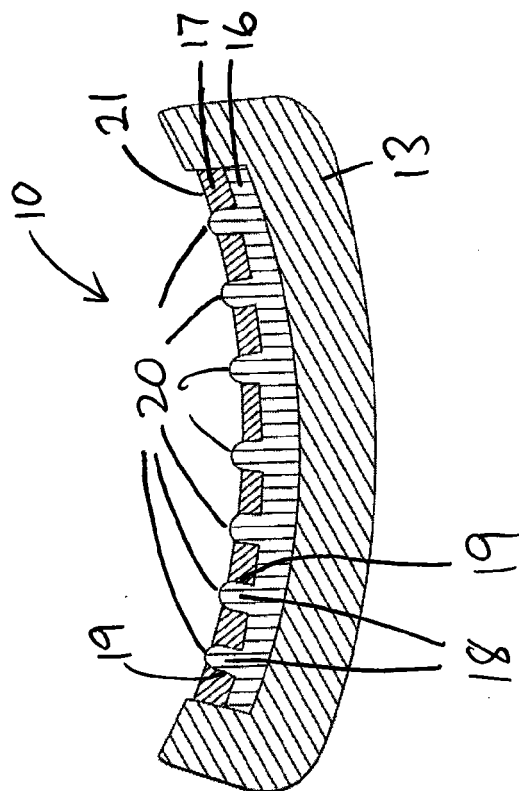


FIGURE 7

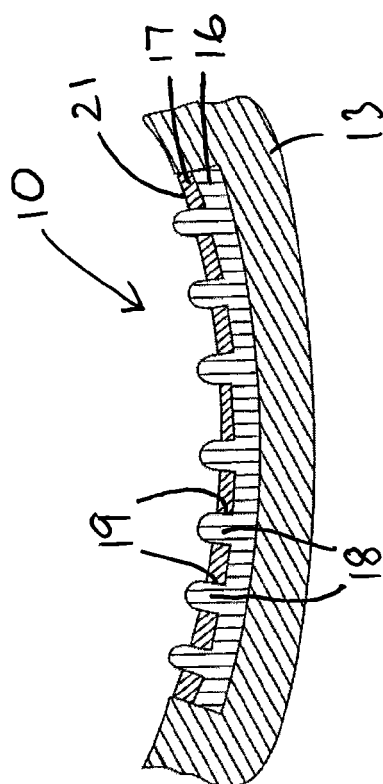


FIGURE 6

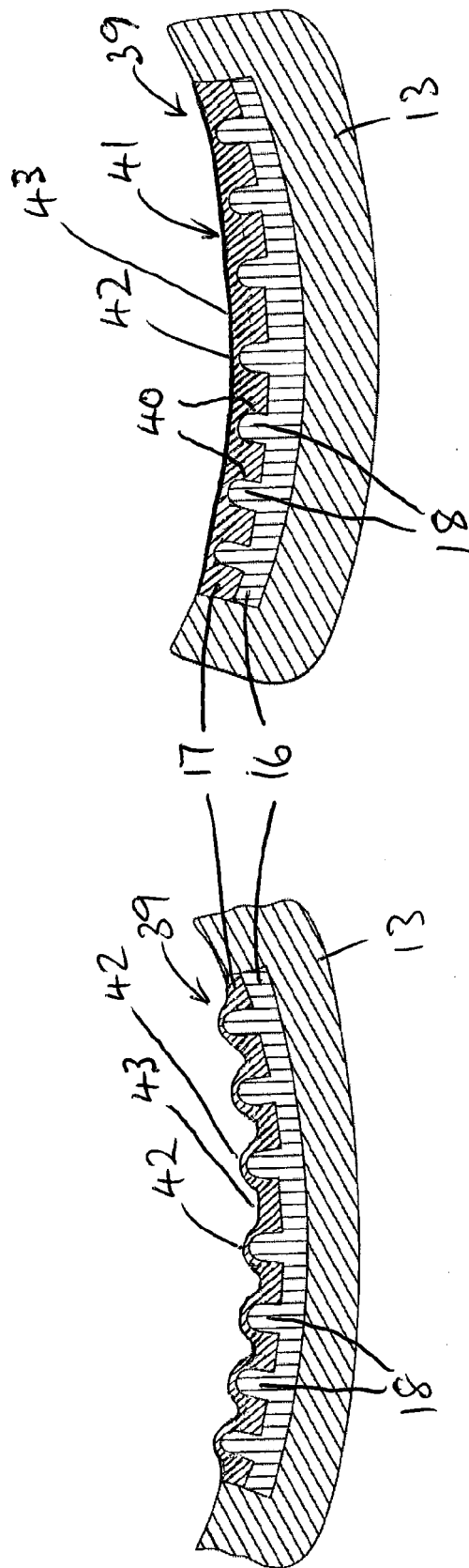


FIGURE 9

FIGURE 8



EUROPEAN SEARCH REPORT

Application Number
EP 09 16 1864

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 December 2009	Examiner Cianci, Sabino
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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.
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