The invention relates to improvements in articles for foot care, for example foot care devices, footwear and insoles for footwear. A body of discrete operative members (30) is provided, the operative members (30) each having a tip portion (31) for interaction with a human or animal foot (40). In use, the operative members (30) can be resiliently deformed by engagement with the foot (40). The operative members (30) of the invention can thus provide cushioning and stimulation to a user.

**Figure 2**

![Diagram of foot care device](image-url)
Title - Articles for foot care

The present invention relates to improvements in articles for foot care, for example foot care devices, footwear and insoles for footwear.

A variety of articles are specifically adapted to care for a person's feet, and these articles include footwear, such as shoes, slippers and socks, and often the insole of that footwear.

Typically, insoles are provided on top of the sole of an item of footwear, such as a shoe, directly beneath the sole of the wearer's foot. Insoles are often removable, but may alternatively be attached to the underlying layers of the sole of the shoe or other item of footwear to form a unitary product.

The general purpose of insoles is typically to provide increased comfort to the wearer, but insoles are also often designed to include specific features which provide certain advantages. For example, conventional insoles may be designed to provide one or more of cushioning, support, insulation and moisture absorption to a wearer. Specifically designed insoles are often used with sports footwear, to provide improved cushioning during physical exercise, or with clinical footwear, to provide support for the foot.

Conventional insoles often comprise a layer of cushioning material and an upper layer which absorbs moisture. Moisture absorption is desirable since complications may arise as a result of dampness of tissue on the surface of the sole of the foot. Cushioning is beneficial in absorbing shock from repeated impacts with the ground and reducing the pressure at certain regions of the sole of the foot.

It is an object of the present invention to provide an article for foot care that provides improvements on conventional foot care, and overcomes or substantially mitigates some, or all, disadvantages associated with conventional foot care.
According to the invention there is provided an article for foot care comprising a body of discrete operative members, the operative members each having a tip portion for interaction with a human or animal foot, and the operative members being resiliently deformable on engagement by the foot.

Interaction with the foot is particularly advantageous because it may improve perfusion or blood circulation in the tissue of the foot, such as the plantar tissue. Perfusion is the delivery of fluid such as blood through a specific area of the body to a capillary bed. The interaction of the tip portion with the foot may stimulate the foot. Stimulation is the raising of physiological or nervous activity in a biological system. Stimulation may also improve sensation in the foot, and may enhance proprioception, strengthen peripheral nerves and decrease numbness and impaired sensation.

Tissue of the sole of the foot can often become damaged as a result of impaired perfusion or blood circulation in the plantar tissue. Changes in the mechanical properties of plantar soft tissue are believed to be responsible for a number of pathologic and non-pathologic traumas such as ulcers and oedema. In particular, patients suffering from diabetic neuropathy may experience decreased sensitivity in the sole of the foot and therefore these patients may not be aware of tissue damage. Interaction with the sole of the foot, thereby providing stimulation, may improve sensation, which may decrease or indeed reverse the symptom of decreased sensitivity associated with diabetic neuropathy. Interaction with the sole of the foot may also improve perfusion or blood circulation by providing a number of changing pressure points on the foot tissue, or through providing a suction function on the foot tissue.

It is known to provide articles for foot care with a number of discrete protrusions to interact with the sole of a foot. However, these protrusions typically comprise small raised rubber cones or domes provided on the surface of the article intended to contact a user's foot. The firmness of the protrusions can cause
discomfort for users, especially if their foot is not supported uniformly by the article.

In contrast, the operative members provided on the article of the present invention are resiliently deformable on engagement by the foot, e.g. under the weight of the foot, to advantageously provide a cushioning function.

The invention has also been found to have advantages in wound treatment. As described above, the operative members can help to improve perfusion or blood circulation in a subject. Using the operative members underneath a wound provides stimulation on the wound bed that promotes perfusion and microcirculation that in turn increases the healing efficiency of the wound. It will be understood that a wound bed is the base or floor or a wound such as a burn, laceration, or chronic ulcer.

Furthermore, the operative members can provide support underneath the wound bed by promoting an even and minimal pressure distribution that can be linked to improved wound healing efficiency by allowing the wound dressing to be attached to the wound bed by providing an optimal contact between the two surfaces. Since the members are readily collapsible, changes in the wound volume would not hinder the optimal performance and effectiveness of the operative members as they can operate as effectively at the largely deformed shape (i.e. with extreme deflection of each member). The invention therefore allows for optimal pressure distribution, stimulation and perfusion to be facilitated in a wound bed. To heal properly, a wound bed should have a rich supply of capillary blood, be free of necrotic debris, and be uninfected. For all wound beds proper offloading and contact with the wound dressing is of utmost importance.

In many cases the operative members will contact a dressing applied over the wound bed and provide the described benefits to the wound bed through the dressing. The dressing may be of any suitable type, including silver or active dressings as well as more conventional dressings.
In some cases, however, the operative members may contact the wound bed directly.

Additionally, although described in the present application in relation to footcare, it should be understood that the wound treatment benefits, and indeed other aspects of the invention, could be applied to other parts of the body to treat, for example, bedsores, surgical wounds etc substantially as described above. The tip portion may interact with the relevant area of a body (eg the wound bed) and the operative members resiliently deform under the load applied through the interface.

The article of the present invention may be footwear, for example a shoe, a cast walker, a total contact cast, an in-sock, a slipper, a sock, or the like. The body of discrete operative members may be provided on the sole, vamp, toe cap and/or the quarter of a shoe, for example, and may be provided on an interior surface of the footwear. Alternatively, the article may be an accessory for footwear, which may be engaged with footwear, eg placed inside the footwear, to provide desired interaction of operative members in a selected area of the foot. The operative members may provide interaction with the plantar, dorsal, medial and/or lateral parts of the foot.

The footwear may be everyday footwear, such that interaction of the operative members with the foot may occur throughout the day, for example, thereby providing effects of stimulation, and cushioning, to the user continually at no inconvenience. A further advantage of providing the body of discrete operative members in footwear is that the tip portions may provide an interaction with the foot that improves circulation and sensation in a wide variety of different areas of the foot.

The article may be an insole, which may be integrally formed in footwear, or may be an accessory for footwear. The tip portions may be for interaction with the sole of the foot, and the operative members may be resiliently deformable
under the weight of the foot. The action of walking may cause the wearer's weight to facilitate sufficient interaction between the tip portions and the sole of the foot to promote perfusion and/or stimulation.

The insole may be shaped to fit inside an item of footwear, such as a shoe. The insole may have a shape that corresponds to the shape of the sole of an item of footwear. Alternatively, the insole may be an insert that fits into a specific area, for example a heel insert.

The article may be a foot care device, which is not footwear. For example, the article may be a device that is specifically adapted to treat the foot. In particular, the foot treatment device may comprise an operative surface adapted to be engaged by a foot of a user, the operative surface comprising the body of discrete operative members. The operative surface may be adapted to support a foot, eg the sole of the foot, such that a user may stand upon the operative surface. The foot treatment device may therefore have the form of a mat, a rug, a carpet, a bath mat, a foot rest, a step, or the like. The tip portions may be for interaction with the sole of the foot, and the operative members may be resiliently deformable under the weight of the foot.

An advantage of the article being a foot treatment device is that the user may perform specific exercises on the mat, to achieve stimulation of the foot that may not be possible where the article is footwear.

The operative members may deform or collapse on engagement by the foot, eg under the weight of the foot. The operative members may collapse fully or partially on engagement by the foot, eg under the weight of the foot. Alternatively, or additionally, the operative members may be compressed or may react to the pressure of the foot by changing structure. The operative members may be arranged such that the operative members contact adjacent operative members when collapsed, or partially collapsed.
The body of discrete operative members may cover one or several defined regions of a major surface of the article, or may cover the entirety of a major surface of the article. For example, for some users it may be desirable to provide an article, such as footwear or an insole, that provides interaction with the tip portions of the operative members, and cushioning, to only the heel of the foot, whereas for other users it may be desirable to provide an article that provides interaction with the tip portions of the operative members, and cushioning, to the majority or entirety of the sole of the foot.

The operative members may be less than 2 mm in diameter. The thickness of the operative members may vary over different regions of the article. Varying the thickness of the operative members over different regions of the article allows for different levels of cushioning and interaction with the tip portions of the operative members in different regions of the foot as required by the user.

The operative members may be less than 10 mm in length, for example 1, 3 or 5 mm in length. The length of the operative members may vary such that the body of discrete operative members may comprise both longer and shorter operative members. For example, longer operative members, e.g. 5 mm in length, may be provided together with shorter operative members, e.g. 1 mm in length. In use, the tips of the longer operative members may contact the surface of the foot in an unloaded condition, and may deform upon loading; while the tips of the shorter operative members may be spaced from the surface of the foot in an unloaded condition, but may contact the foot in a loaded condition. Hence, in a loaded condition, the longer operative members may provide cushioning whilst the shorter operative members may provide stimulation.

The tip portion of the operative members may be less than 1 mm in diameter.

The body of discrete operative members may comprise more than 1000 operative members.
The operative members may be linear or curved. The body of discrete operative members may comprise both curved and linear operative members. Where curved operative members are used, the tip portion should be understood to be a part of the operative member that will make contact with a foot in use. This need not be the end of the operative member. Providing operative members of different structures is advantageous because the extent to which they deform may vary, thereby providing differing levels of cushioning.

The operative members may comprise support springs. A support spring may encircle each operative member. The support springs may be moulded to the operative members. Alternatively, the operative members may comprise a spring-shaped structure. The support springs may compress on engagement by a foot, e.g., under the weight of a sole of a foot, in use, providing improved cushioning. The support springs may facilitate interaction between the tip portions of the operative members and the foot to improve perfusion and sense enhancement.

The tip portions of the operative members may be shaped to facilitate interaction with the foot. The tip portions may be generally cylindrical or conical in shape. The tip portion may include a recess, into which a portion of the foot may enter, in use, thereby expelling air from the recess and providing a suction force between the tip portion and the foot. The recess may be formed in the tip portion of an otherwise solid operative member. The recess may have any suitable shape, and may be concave, e.g., hemi-spherical. Alternatively, the operative member may be hollow, with the recess being defined by the open end portion of the operative member.

The hollow operative member may be in fluid communication with an air reservoir. The air reservoir may be reducible in volume, in use, and may be compressible. The air reservoir may comprise a cavity and/or or more conduits. The air reservoir may comprise resiliently deformable walls. The air reservoir may comprise walls having a structure that enables compression, such as a bellows structure. In addition, or alternatively, the air reservoir may comprise
walls formed from a readily compressible material, such as an elastomeric material. The air reservoir may be located beneath a base of the hollow operative member. The air reservoir may act, in use, as a pump to expel air from the air reservoir and the hollow operative member, when compressed on engagement by the foot. This may provide increased airflow and an increased suction function, both of which may increase perfusion. Furthermore, the increased airflow may increase aeration, cushioning and pressure point stimulation.

The operative members may be arranged in a predetermined array. The area density of the operative members may vary, for example in different regions of the article.

The operative members may project from a major surface of the article. In footwear, in particular, this not only provides interaction with the foot in use, but also allows a passage of airflow over a surface of the foot, e.g. underneath the sole of the foot, preventing dampness and promoting a dry surface, e.g. a dry plantar surface, to prevent any complications that may occur as a result of dampness.

As the operative members deform or collapse under the weight of the foot, in use, air may be pushed outwards due to narrowing of a space between the sole of the foot and the major surface of the article from which the operative members may project. As the foot lifts away from the operative members, the operative members may revert to their original structure, and air may be sucked into the widening space between the sole of the foot and the major surface of the article from which the fibres may project.

The operative members may project perpendicularly from the surface of the article and/or may project at an oblique angle from the surface of the article. The angle of projection relative to the surface of the article may vary within a region of the body of discrete operative members. Alternatively, the angle of
projection may be substantially constant within a certain defined region, and may be different to the angle of projection within a different defined region.

The feature of the operative members projecting at various angles from the surface of the article is advantageous because it may provide varying levels of cushioning and interaction with the tip portions of the operative members. Operative members that project at oblique angles may provide cushioning of forces that are not perpendicular to the surface of the article.

The operative members may be aligned in a predetermined alignment, for example they may be aligned in the same direction within a certain defined region of the article. The direction of alignment may vary between different regions of the article. A specific alignment of operative members may provide improved cushioning to and physical interaction with different regions of the foot due to the manner in which pressure is exerted by the foot onto the article during loading and unloading.

The operative members may provide a suction function. In use, the sole of the foot may stick to the operative members, the operative members thereby providing a suction function on recovery. The tip portion of the operative members may be concave. A concave tip portion may enhance the suction function. The suctioning function may increase circulation in the tissue of the sole of the foot.

The operative members may be moulded to a major surface of the article. Alternatively, the operative members may be threaded through the surface.

The operative members may comprise fibres, which may be less than 2 mm in diameter. The fibres may comprise a body that has a substantially uniform cross-sectional shape and/or area. The fibres may be natural or artificial, textile or non-textile fibres. The fibres may be microfibres or nanofibres.
Alternatively, the operative members may comprise a viscoelastic material, for example silicone rubber or a gel.

The operative members may provide a moisture absorption function. The operative members may comprise moisture absorbing fibres. The moisture absorbing fibres may absorb dampness and promote a dry plantar soft tissue.

The operative members may take a form similar to natural turf. In use, the article may provide the wearer with the feel and function of walking barefoot on cushioned turf.

The insole may be shaped to fit inside an item of footwear, such as a shoe. The insole may be the shape of the entire sole of an item of footwear. Alternatively, the insole may be an insert that fits into a specific area, for example a heel insert.

The body of discrete operative members may be located on a layer of the article. The article may comprise more than one layer, for example two or three layers. The layers may be discrete layers that may be glued together.

The total thickness of the article may be between 5 and 20 mm, for example approximately 10 mm.

Where more than one layer is provided, the layer comprising the body of operative members may be the top surface of the article, being closest to the surface of the foot in use.

The article may further comprise a base layer, being furthest from the surface of the foot in use. The base layer may be a conventional base layer used in insoles which will be known to a person skilled in the art. The base layer may comprise a visco-elastic material. The base layer may comprise rubber. The thickness of the base layer may be between 1 and 7 mm, for example 3-5 mm.
The base layer may provide a means for holding together at least one further layer. The base layer may ensure the article remains intact.

The base layer may provide cushioning and/or act as a shock absorber.

The article may further comprise a middle layer, located between the top layer and base layer. The middle layer may be a viscous layer. The middle layer may provide a cushioning function. The middle layer may comprise a viscous granulated material. The thickness of the middle layer may be between 1 and 7 mm, for example 3-5 mm.

The middle layer may comprise a slow rebound material, for example having a rebound time of between 0.05 and 0.50 seconds. The slow rebound material may be a low density foam. The slow rebound material may have a lower shore hardness than the base layer.

The middle layer may provide a custom fit to the foot of the user. The level of viscosity may vary across the middle layer, for example providing different viscosities in different regions of the middle layer, to provide a cushioning function that is customised for the needs of the individual user.

In use, the viscous layer may provide the feeling of walking on damp natural turf, or the feeling of walking on a muddy field or on damp sand.

The article may comprise a fibre mesh layer. The fibre mesh layer may be positioned between the layer of operative members and the middle layer and/or base layer. The fibre mesh layer may provide further physical interaction with the foot, in particular when the operative members are compressed or collapse on engagement by the foot, eg under the weight of the foot. The presence of the fibre mesh may improve perfusion and nerve stimulation.
Certain embodiments of the invention will be described in further detail below by way of example only, with reference to the accompanying drawings, of which:

Figure 1 is a section view of an insole according to a first example of the invention;

Figure 2 is a section view of the insole in use according to the first example of the invention;

Figure 3 is a section view of the insole in use according to the first example of the invention;

Figure 4 is a section view of an insole according to a second example of the invention;

Figure 5 is a section view of an insole according to a third example of the invention;

Figure 6 is a section view of an insole according to a fourth example of the invention;

Figure 7 is a section view of an insole according to a fifth example of the invention;

Figures 8a to 8d are views of fibre structures according to examples of the invention.

Figures 9a to 9c are views of fibre structures according to further examples of the invention.

Figures 10a to 10f are views of fibre structures according to further examples of the invention.
Figures 11a to 11h are views of fibre structures according to further examples of the invention.

Figures 12a to 12c are views of fibre structures according to further examples of the invention.

Figures 13a to 13d are views of fibre structures according to further examples of the invention, where Figure 13c is a cross-sectional view along the line XIII-XIII in Figure 13b.

Referring firstly to Figure 1, the insole comprises a base layer 10 and a viscous layer 20. Straight fibres 30 are woven through the base layer 10 and the viscous layer 20 and project substantially perpendicularly from the surface 22 of the viscous layer 20.

The base layer 10 is made of a rubber material and is approximately five millimetres thick. The viscous layer 20 is glued to the base layer. The viscous layer 20 is a low density foam and is also approximately five millimetres in thickness. The base layer 10 and viscous layer 20 provide a smooth flat surface which may deform under the weight of a foot in use.

The fibres 30 are arranged in a regular array. The fibres 30 are all approximately the same length and the length of the portion of the fibres 30 that are upstanding from the viscous layer 20 is approximately five millimetres.

Figures 2 and 3 show the insole in use, with Figure 2 showing the insole during loading and Figure 3 showing the insole during unloading. During loading, the foot 40 moves towards the insole in the direction of the arrow 42, and the fibres 30 bend under the weight of the foot. Air in the space between the sole of the foot 40 and the viscous layer 20 is pushed outwards in the direction of arrows 44, 45 as the space between the sole of the foot 40 and the viscous layer 10 gets smaller. As the fibres 30 buckle under the weight of the foot 40,
cushioning is provided. The tips 31 of the fibres 30 maintain contact with the sole of the foot 40, to provide a physical interaction to increase perfusion and provide nerve stimulation. During unloading, as shown in Figure 3, the foot 40 moves away from the insole, in the direction as shown by arrow 46. The fibres 30 recover towards their original straight shape. The space between the sole of the foot 40 and viscous layer 22 gets wider, and air is sucked in to the space as indicated by arrows 48, 49, which aerates the sole of the foot.

Figure 4 shows a cross-section view of a second example of an insole. This insole comprises the base layer 10, viscous layer 20 and fibres 30 as shown in Figure 1, but the insole also comprises a layer of fibre mesh 32 on the surface 22 of the viscous layer 20. The fibre mesh 32 provides further interaction with the sole of the foot when the fibres 30 are bent or compressed under the weight of the foot.

Figure 5 shows a cross-section view of a third example of an insole. This insole comprises the base layer 10, the viscous layer 20 and the fibres 30, as shown in the example in Figure 1, but the straight fibres 30 in this example comprise support springs 34 that surround each fibre 30. The support springs 34 provide increased cushioning capability of the fibres 30.

Figure 6 shows a cross-section view of a fourth example of an insole, with a base layer 10 and viscous layer 20. In this insole, the fibres are woven through the base layer 10 and viscous layer 20 such that some fibres 30 project approximately perpendicularly from the viscous layer 20, whereas other fibres 36 project at an angle of approximately 15° from the normal to the surface of the viscous layer 20.

Figure 7 shows a cross-section view of a fifth example of an insole. This insole comprises a base layer 10, a layer that comprises viscous granular material 24, and fibres 30 woven through the base layer 10 and layer of viscous granular material 24.
The fibres 30, 36 in Figures 1 to 7 are straight, however the fibres may also be curved. Figures 8a to 8d show examples of curved fibres 52, 54, 56, 58. The curved structures of the fibres may provide a more controlled collapse of the fibre when in contact with the sole of a foot.

In Figures 1 to 7, it is the ends of the straight fibres 30, 36 that contact the sole of the foot and thus constitute the tip portion 31 of each operative member. Similarly, in Figures 8a, 8b and 8d the free ends of the curved fibres 52, 54, 58 would generally contact the foot, and thus be considered the tip portions 51. In Figures 9a to 9c, however, the fibres 62, 64, 66 are curved or bent such that a curved portion 63, 65 or pointed portion 67 of the fibre may contact the sole of the foot in use. As such, in these examples the tip portion would be considered to be the curved or pointed portion 63, 65, 67. Equally, curved portions of fibres 52, 54, 56, 58 of Figures 8a to 8d may form discrete contact points with the sole of the foot when compressed, and could thus be considered tip portions. These curved portions may provide secondary interaction with the sole of the foot. As the operative members are compressed, the length of the curved tip portion that is in contact with the sole of the foot may increase.

The fibres 68, 70, 72, 74, 76, 78 shown in Figures 10a to 10f, as well as the fibre 58 in Figure 8d, are structures in which each fibre splits into two end portions above the surface of the viscous layer 20. Such fibre structures may provide improved interaction with the foot due to an increase in the number of fibre tips in contact with the sole of a foot, in use. Such fibres structures may also provide enhanced function as the two end portions may act in a couple. Furthermore, the combination of a "sharp" tip portion which is the end of one end portion, and a "blunt" tip portion which is a curved portion of the other end portion, allows for simultaneous "sharp" and "blunt" interaction.

In Figures 11a to 11f, the fibres 80, 82, 84, 86, 88, 90, 92, 94, comprise loop structures that are able to change shape on compression. Such loop structures provide an increased resistance to deforming under the weight of the foot, and therefore improve cushioning. Furthermore, these structures may provide
staged interaction with the foot, wherein the tip portion that is the end of the fibre provides an initial interaction with the sole of the foot, and as the structure is compressed a curved tip portion provides a secondary interaction.

The fibres 30, 36 of Figures 1 to 7 are woven through the base layer and viscous layer such that both ends of each fibre 30, 36 may contact the sole of the foot. In Figures 12a to 12c, the fibres 96, 98, 100 are woven through the viscous layer such that both ends of each fibre are embedded in the viscous layer, and a pointed portion 97 or curved portion 99 or branch portion 101, generally in the middle of the length of each fibre, projects from the viscous layer to contact the sole of the foot in use. These fibre structures 96, 98, 100 may provide different levels of cushioning and interaction compared to straight fibres 30, 36.

Other examples of fibre structures are shown in Figures 13a and 13b. In Figure 13a, the fibre 102 is a hollow, tubular fibre. In Figure 13b, the fibre 104 is comprises a concave tip portion 105. For clarity, Figure 13c shows a cross-sectional view of the fibre 104 of Figure 13b.

The hollow fibre 102 may comprise an air reservoir 106, as shown in Figure 13d. The air reservoir 106 comprises a cavity, the cavity being in fluid connection with the cavity of the hollow tubular fibre 102. The air reservoir 106 is located beneath the base of the hollow fibre, and in Figure 13d is located beneath the viscous layer 20. In other example embodiments, the air reservoir may be located above the viscous layer 20. The air reservoir 106 in Figure 13d comprises a bellows wall structure that is compressible on engagement with the sole of the foot. In other example embodiments, the air reservoir may comprise walls formed of an elastomeric material, such that it is compressible on engagement with the sole of the foot.

The advantage of the fibres 102, 104 being hollow or comprising a concave tip portion is that these structures may provide improved air flow and suctioning function. As the sole of a foot contacts the fibre 102, 104, the air is pushed out
of the hollow region 103 of the fibre 102 or of the concave recess at the tip portion 105 of the fibre 104. Upon recovery, the hollow region 103 or the concave tip portion 105 provide a suctioning function to the sole of the foot. The air reservoir 106 acts as a pump, and enables a larger volume of air to be expelled from the fibre 102, as the sole of the foot contacts the fibre 102 and compresses the air reservoir 106. This may provide increased air flow and suction.

The examples above are given only to help explain the nature of the invention, and are not intended to limit the protection sought. Features described in relation to one example may be applied, where suitable, to another example. In particular, the angled fibres 36, shown in Figure 6, could similarly be included in insoles comprising the fibre mesh layer 32 as shown in Figure 4 or in insoles comprising the granulated viscous layer of Figure 7. Equally, the spring supports 34 surrounding the fibres 30, shown in Figure 5, could similarly surround the angled fibres 36 as shown in Figure 6.
CLAIMS

1. An article for foot care comprising a body of discrete operative members, the operative members each having a tip portion for interaction with a human or animal foot, and the operative members being resiliently deformable on engagement by the foot.

2. An article as claimed in claim 1, wherein the article is footwear.

3. An article as claimed in claim 1, wherein the article is an insole.

4. An article as claimed in any preceding claim, wherein the tip portion is for interacting with the sole of the foot and the operative members are resiliently deformable under the weight of the foot.

5. An article as claimed in any preceding claim for treating a wound, wherein the tip portion stimulates, in use, the wound bed of the wound.

6. An article as claimed in claim 5, wherein a dressing is provided between the wound bed and the operative member, and wherein the tip portion interacts, in use, with the dressing to stimulate the wound bed.

7. An article as claimed in claim 5, the tip portion interacts directly with the wound bed.

8. An article as claimed in any preceding claim, wherein the thickness and/or density of the operative members varies over different regions of the article.

9. An article as claimed in any preceding claim, wherein the length of the operative members is less than 10 mm.
10. An article as claimed in any preceding claim, wherein the body of discrete operative members comprises both longer and shorter operative members.

11. An article as claimed in any preceding claim, wherein the operative members comprise support springs.

12. An article as claimed in any preceding claim, wherein at least some of the operative members are linear.

13. An article as claimed in any preceding claim, wherein at least some of the operative members are curved.

14. An article as claimed in any preceding claim wherein the tip portion includes a recess.

15. An article as claimed in any claim 14, wherein the operative member is hollow and the recess is defined by an open end portion of the operative member.

16. An article as claimed in claim 15, wherein the operative member is in fluid communication with an air reservoir, the air reservoir being reducible in volume, in use.

17. An article as claimed in any preceding claim wherein at least some of the operative members project perpendicularly from a major surface of the article.

18. An article as claimed in any preceding claim wherein at least some of the operative members project at an oblique angle from a major surface of the article.

19. An article as claimed in any preceding claim, wherein the operative members are arranged in a predetermined array.
20. An article as claimed in claim 17, wherein alignment direction of the operative members is variable in the predetermined array.

21. An article as claimed in any preceding claim, wherein the operative members are fibres.

22. An article as claimed in claim 21, wherein the fibres are microfibres.

23. An article as claimed in any preceding claim comprising a base layer and a top layer, wherein the body of discrete operative members provides the top layer of the article.

24. An article as claimed in claim 23, wherein the discrete operative members are threaded through the base layer.

25. An article as claimed in claims 23 or 24 further comprising a fibre mesh layer.

26. An article as claimed in any of claims 23 to 25, wherein the base layer comprises a visco-elastic material.

27. An article as claimed in any of claims 23 to 26, wherein the base layer comprises a viscous material.

28. An article as claimed in any of claims 23 to 27, further comprising a viscous material layer.

29. An article as claimed in claim 27 or 28, wherein the viscous material is a low density foam.

30. An article as claimed claim 27 or 28, wherein the viscous material is a granulated material.
31. An article as claimed in any of claims 27 to 30, wherein the viscous material is a slow rebound viscous material.

32. An article as claimed in claim 31, wherein the slow rebound viscous material has a rebound time of between 0.05 and 0.50 seconds.

33. An article as claimed in any of claims 27 to 32, wherein the viscosity of the viscous layer varies across the layer.
<!DOCTYPE html>
<html><head></head><body><pre>INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER
INV. A43B7/14 A43B13/40
ADD.

According to International Patent Classification (IPC) and to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tr>
<td>X</td>
<td>wo 2007/136272 AI (SYRAN CHRISTOPHER [NO]) 29 November 2007 (2007-11-29) figures</td>
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<td>X</td>
<td>GB 2303780 A (R &amp; S SALES COMPANY INC [US]) 5 March 1997 (1997-03-05) figures</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
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- "P" document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search: 25 August 2016
Date of mailing of the international search report: 01/09/2016

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European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer
Gki onaki, Angel i ki

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<th>Relevant to claim No.</th>
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<td>EP 0 578 618 A1 (MENGHI SHOES SRL [IT]) 12 January 1994 (1994-01-12) figures</td>
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<td>Patent document cited in search report</td>
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