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(54) **Footwear**

(57) The invention relates to a footwear sole component and to an article of footwear (2) comprising such a sole component. There is provided a sole component, which is suitably an insole (1), which comprises toe and heel portions, (30), (20) connected by an arch portion (40), and is arranged, in use, to form a part of a sole of a closed article of footwear (2) having a foot chamber (90), wherein the sole component comprises at least

one compressible passage (11) extending between first and second portions of the sole component and arranged, in use, to have openings into first and second regions of the foot chamber (90) such that air can be caused to travel from said passage (11) into a second region of the foot chamber (90), by a pumping effect caused by compression of the passage (11) along at least a part of its extent during a stage of a wearers walking cycle.

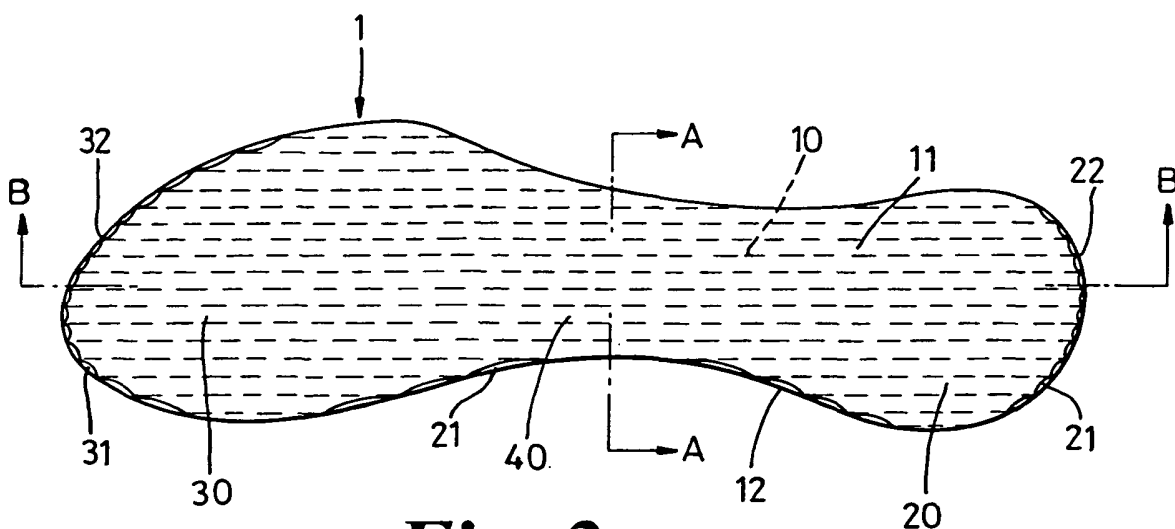


Fig. 2

Description

[0001] The present invention relates to a footwear sole component, particularly, though not exclusively, an insole for an article of footwear and to an article of footwear comprising such a sole component.

[0002] There exist various types of footwear, including "closed" footwear such as, for example, boots, shoes and trainers. Articles of closed footwear have an upper lasted to a sole to form a foot chamber arranged to accommodate a users foot.

[0003] The sole itself can be of a number of constructions but always comprises an outer sole having an outer surface arranged to contact the ground. In the most basic articles of footwear the upper is lasted to this and a user's foot contacts an inner surface of the outer sole. More normally an article of footwear further comprises an insole arranged to sit between the outer sole and a user's foot. Such an insole may be integrally formed with the article of footwear or may be removable therefrom.

[0004] Articles of footwear may also comprise a mid sole interposed between the insole and outer sole. Soles can thus have a sandwich structure.

[0005] It is also known to provide underbeds (or undersoles) for articles of footwear which can be inserted below an insole to provide another layer to the sole structure.

[0006] Regardless of their specific sole construction, closed articles of footwear provide a foot chamber which can be prone to become hot and/or sweaty in use. This can be a particular problem in hot environments, when a wearer exercises, or if the wearer is prone to perspire excessively.

[0007] When a foot chamber becomes hot and/or sweaty it can create several problems for a wearer. A wearer may experience discomfort as a result of the heat and/or damp environment in which their foot is accommodated. The conditions within the foot chamber may promote bacterial and/or fungal activity and may result in increased creation of malodours and/or skin infections. After use the footwear may retain the malodours and this can be unpleasant for those around the footwear.

[0008] Various attempts have been made to address the above difficulties. For example, breathable materials have been employed in the uppers of articles of footwear to improve the ventilation of a wearer's foot and allow egress of perspiration from the foot chamber.

[0009] Attempts have also been made to increase ventilation in the foot chamber by supplying air from a point external of the foot chamber into the foot chamber.

[0010] It is known from US 4547978 to provide articles of footwear having a plurality of cavities in the sole which can contain air and are compressed when the sole contacts the ground to pump air from the sole into the foot chamber. The cavities are though formed in the outer sole and to enter the foot chamber air must first pass through a porous insole. Additionally, although the cav-

ities are linked by channels in the outer sole these are open and enclosed only by the porous insole, thus air may be predominantly pumped into the foot chamber only in the immediate vicinity of the cavities. The mechanism of ventilation also requires the sole to be adapted specifically to comprise cavities for the purpose of ventilation.

[0011] GB 2382017 discloses an under-foot layer which can be an insole, footbed, or mid sole which comprises a plurality of air flow channels arranged to convey air to a ball/toe portion from a portion of the layer remote therefrom via a branched flow path. However, the under-foot layer must have at least one channel which is connectable to a pump located in the heel for causing conveyance of the air. The pump can thus complicate the construction of an article of footwear employing such an under-foot layer and consequently employing the under-foot layer may be undesirably costly.

[0012] The known approaches to tackling the difficulties associated with ventilating foot chambers of closed articles of footwear have not proved entirely satisfactory. Accordingly, the present invention aims to address at least one disadvantage associated with known articles of footwear whether discussed herein or otherwise.

[0013] According to the present invention there is provided a footwear sole component comprising a toe portion and a heel portion connected by an arch portion, the sole component being arranged, in use, to form a part of a sole of a closed article of footwear having a foot chamber, wherein the sole component comprises at least one compressible passage extending between a first portion of the sole component and a second portion of the sole component, which passage is arranged, in use, to have an opening into a first region of the foot chamber and an opening into a second region of the foot chamber such that air can be caused to travel from said passage into a second region of the foot chamber, by a pumping effect caused by compression of the passageway along at least a part of its extent during a stage of a wearers walking cycle.

[0014] Suitably, the sole component is arranged such that, in use, air can be caused to travel from the first region of the foot chamber to the second region via at least one passage therein.

[0015] The sole component may be provided as a component of an article of footwear. The sole component may comprise a removable component of an article of footwear. Alternatively, the sole component may comprise an integral part of an article of footwear.

[0016] Alternatively, the sole component may be provided as a retro-fit component for a user to add to an article of footwear. Suitably, the sole component can be employed in any type of shoe, boot or trainer.

[0017] The sole component may comprise an insole. Suitably, the insole comprises a removable insole. The insole may be transferable between articles of footwear.

[0018] Alternatively, the sole component may comprise an underbed, or a part of a midsole, arranged to

lie immediately below an insole.

[0019] Suitably, if the sole component comprises an underbed or part of a midsole, an insole under which it lies will consist of a thin flexible sheet member. Suitably, the insole will be porous and/or have apertures to allow the first and second regions of the foot chamber to be in communication with the openings of one or more passages of the sole component.

[0020] Suitably, the sole component comprises a plurality of passages. The sole component may comprise at least 3 passages, preferably at least 5 passages, more preferably at least 20 passages, for example around 30 passages. Preferably, there is no fluid communication between the passages along their extent. Each passage may thus transport air independently of the others. Suitably, one or more of said passages is resiliently deformable.

[0021] Preferably, each passage is compressible. Preferably, a plurality of passages are arranged, in use, to be compressed for at least part of their extent during a stage of a wearer's walking cycle. Each passage may be arranged, in use, to be compressed for at least part of its extent during a stage of a wearers walking cycle. Suitably, at least one of the or each passage is arranged to be compressed by the weight of a part of a wearer's foot acting on the passage during a stage of the wearers walking cycle. Preferably, each passage is arranged to be compressed in this manner.

[0022] Suitably each passage is resiliently deformable. Suitably each passage is resiliently deformable and arranged, in use, to serve as an active pumping means for causing conveyance of air rather than as a passive conduit which simply carries air. Suitably, the sole component consists essentially of resiliently deformable passages and means, such as tube walls, defining said passages.

[0023] Suitably, the sole component does not comprise any pumping means in addition to the one or more passages. Suitably, the sole component can be employed in an article of footwear which does not comprise any additional pumping means. Suitably, the sole component does not comprise any cavities or chambers in communication with said passage or passages. Suitably, said passage or passages do not comprise any enlarged portions which would serve as cavities or chambers. The sole component may thus not rely on the compression of a chamber or cavity to pump air in a bellows pump type action. Instead, movement of air through the sole component may be caused by progressive compression of passages of the sole component.

[0024] Suitably, the sole component does not contain valves.

[0025] Suitably, the first portion of the sole component comprises the heel portion thereof. Preferably, the first portion comprises a peripheral edge of the heel portion.

[0026] Suitably, the second portion of the sole component comprises the toe portion thereof. Preferably, the second portion comprises a peripheral edge of the

toe portion.

[0027] Suitably, the first region of the foot chamber accommodates the wearer's heel.

[0028] Suitably, the second region of the foot chamber accommodates the wearer's toes.

[0029] Suitably, the sole component is arranged, in use, to suck air in at the heel and transmit it to the toes. After expulsion from the sole component at the toes the air may then travel over the top of the foot toward the heel. The sole component may be such that, in use, it substantially neither draws in air or expels air from areas other than the heel and toe regions.

[0030] Suitably, at least one of the or each passage of the sole component extends longitudinally, the longitudinal direction being from heel to toe. Suitably, each passage of the sole component extends longitudinally.

[0031] Suitably, at least one passage is arranged to be compressible throughout its longitudinal extent. Preferably, each passage is arranged to be compressible throughout its longitudinal extent. The or each passage may thus be able to provide an active pumping action when compressed at any point along its longitudinal extent. Suitably, substantially any part of the sole component may act as a pump independently of the rest. The sole component may thus not require a force to be applied at a specific pump area to produce a pumping effect. For example, even if a user walked only on the balls of their feet there would still be a pumping effect.

[0032] Suitably, one or more passages extend from the heel portion to the toe portion. Suitably, one or more passages extend between peripheral edges of the heel and toe portion.

[0033] Suitably, at least one passage has a cross-sectional area of between 0.1 mm² and 15 mm², for example between 0.5 mm² and 5 mm². Suitably, each passage has a cross-sectional area of between 0.1 mm² and 15 mm², for example between 0.5 mm² and 5 mm². Preferably, the or each passage has the same cross-sectional area throughout its extent. The or each passage may comprise throated portions to assist the expulsion of air there from. The passages may thus have substantially the same cross-sectional area throughout their extent except at said throated portions.

[0034] Suitably, the or each passage comprises an enclosed and open ended conduit. Suitably, the conduit is formed from a substantially gas impermeable and resiliently deformable material. Suitably, the or each passage comprises a tube. The or each tube may comprise a cylindrical tube. Preferably, the sole component comprises a plurality of tubes. Preferably, the sole component comprises an array of parallel passages which preferably comprise tubes. Suitably, the sole component comprises a plurality of tubes lying side by side. Suitably, the tubes are conjoined.

[0035] Suitably, at least one tube has an outer diameter of between 1 mm and 5 mm. Suitably, each tube has a diameter of between 1 mm and 5 mm. Suitably, each tube has an outer diameter of around 3 mm.

[0036] Suitably, the or each tube has a wall thickness of between 0.25 mm and 1.6 mm.

[0037] Suitably, the sole component comprises a resiliently deformable polymer. Suitably, the sole component comprises a resiliently deformable rubber, plastics or thermoplastic rubber material. Suitably, the or each tube comprises a resiliently deformable rubber, plastics or thermoplastic rubber material. The sole component may comprise silicone rubber. Alternatively, the sole component may comprise PVC or natural rubber.

[0038] Each tube may be bonded to one or more adjacent tubes. Adjacent tubes may be directly bonded to one another. Alternatively, adjacent tubes may be joined by a bridging wall. Alternatively, or in addition, the tubes may be mounted to a backing sheet.

[0039] The tubes may be spaced apart to provide a gap into which the tube walls can deform when the tubes are compressed in use. The tubes may be mounted to a backing sheet in said spaced relationship.

[0040] Suitably, adjacent tubes are joined by a bridging wall which suitably holds the tubes in spaced relationship when they are uncompressed. Suitably, a bridging wall connects adjacent tubes at the tubes equators. The sole component may comprise a plurality of bridging walls which may connect adjacent tubes at their equators. Alternatively, the sole component may comprise a backing sheet which comprises a single bridging wall connecting the tubes. Suitably, the bridging wall or walls and tubes are formed integrally. The bridging wall or walls and tubes may be formed by extrusion.

[0041] Suitably, the tubes are spaced such that the axis of adjacent tubes lie a distance of around $nd/2$ from one another (where d is the tube diameter). The sole component may thus be compressible to a substantially flat form.

[0042] The tubes and backing sheet may be formed integrally, for example by extrusion. Alternatively, the tubes may be adhered to a backing sheet.

[0043] The sole component may comprise an insole and the backing sheet may comprise a covering for the tubes arranged, in use, to be interposed between the tubes and a user's foot. Suitably, the covering comprises a cloth material. Alternatively, the covering may comprise a leather material.

[0044] Alternatively, the sole component may comprise a first (upper) and second (lower) sheet spaced apart by a plurality of walls, said walls being arranged to define conduits between themselves and the first and second sheets. The walls may be spaced apart to provide a gap into which the walls can deform when the sole component is compressed in use. The walls and first and second sheets may be formed integrally, for example by extrusion.

[0045] The sole component may comprise an insole and a covering may be provided for the first sheet and be arranged, in use, to be interposed between the first sheet and a user's foot. Suitably, the covering comprises a cloth material.

[0046] Alternatively, the covering may comprise a leather material.

[0047] Preferably, the or each passage is arranged, in use, to convey air to a second region of a foot chamber by means of a peristaltic pumping action.

[0048] Suitably, in use, when a wearer is walking and/or running with a normal gait the portion of at least one passage in the heel portion of the sole component is compressed as a wearers foot (in the footwear) strikes the ground. As the wearer rocks their foot forward to continue walking their weight may move along the sole component toward the toe portion thereof. Accordingly, the portion of the passage in the arch region and then subsequently the toe region of the sole component may be compressed while the heel portion of the passage and then subsequently the arch region of the passage may expand to their former configuration.

[0049] Air in the passage in front of the compressed portion may thus be forced along and out of the passage into the toe region of the foot chamber.

[0050] As weight is moved along the sole component toward the toe air may be drawn into and along the passage from the heel region of the foot chamber.

[0051] Suitably, the sole component comprises an extruded component.

[0052] Suitably, the sole component comprises an insole.

[0053] Suitably, the insole is arranged such that at least a part of a peripheral edge of the heel portion does not abut the heel part of the upper of an article of footwear in use. There may thus be a clear airflow pathway between the upper and the peripheral edge of the insole such that air can be drawn into an opening of one or more passages in the insole from the heel region of the foot chamber.

[0054] Suitably, the insole is arranged such that at least a part of a peripheral edge of the toe portion does not abut the toe part of the upper of an article of footwear in use. There may thus be a clear airflow pathway between the upper and the peripheral edge of the insole such that air can be expelled through an opening of one or more passages in the insole into the toe region of the foot chamber.

[0055] Suitably, the sole component is arranged such that when a wearer is standing still, in use, the user's weight will be supported substantially without the passages collapsing. Suitably, the sole component is arranged such that passages will collapse, in use, when a user walks. Suitably, the passages will collapse when a user runs.

[0056] Suitably, the sole component is arranged to support a pressure of at least 20kPa, preferably at least 40kPa, for example at least 80kPa, substantially without the passages collapsing.

[0057] Suitably, the sole component is arranged such that the passages substantially fully collapse when a pressure exerted thereon exceeds 200kPa, preferably when it exceeds 150kPa, for example when it exceeds

100kPa.

[0058] Suitably, the sole component is arranged such that the passages substantially fully collapse when subjected to a pressure of between 40kPa and 200kPa.

[0059] The insole may be manufactured with a predetermined configuration to allow it to fit within an article of footwear having a particular size. The insole may be configured such that it can be fitted into an article of footwear having a particular standard size. A standard size might for example be a UK mens size 9 shoe.

[0060] The insole is suitably thin. The insole may have a thickness of less than 10 mm, preferably less than 7 mm, for example of 5 mm or less. Suitably, the insole has a thickness of between 3 and 5mm. The insole may thus be suitable for fitting into substantially any article of closed footwear without adversely affecting a wearer's comfort. The insole may thus be suitable for use as a retro-fit component.

[0061] The insole may be such that it can be cut to size. Suitably, the insole when provided as a retro-fit component is configured such that it can be cut to fit within an article of footwear having a particular size within a predetermined range. Suitably, the insole may fit within an article of footwear having the maximum size in said predetermined range without cutting.

[0062] Suitably, the insole is provided with one or more markings to indicate where it should be cut to provide a predetermined configuration which will allow it to fit within an article of footwear having a particular size. Preferably, the or each marking indicates configurations which will allow the insole to be fitted into an article of footwear having one of a number of particular standard sizes. Suitably, markings indicate at least two configurations to which the insole could be cut and each configuration corresponds to a standard footwear size. Suitably, the uncut insole corresponds to a standard footwear size. The insole may thus be suitable for fitting into at least three different standard sizes of footwear.

[0063] Suitably, the insole is provided with markings to indicate where it should be cut to provide configurations which correspond to at least 3 different standard sizes, more preferably at least 4, for example at least 5.

[0064] The standard sizes may be determined by any one of a number of known standards, for example they may be UK, US or continental European standard sizes.

[0065] The insoles may be provided with markings corresponding to mens sizes or womens sizes or both.

[0066] An insole may for example be configured such that it fits a UK mens size 12 shoe without cutting and may be provided with markings to indicate where it should be cut to provide a configuration which fits within a UK mens size 11, 10, 9, 8 or 7 shoe.

[0067] An insole may for example be configured such that it fits a UK ladies size 9 shoe without cutting and may be provided with markings to indicate where it should be cut to provide a configuration which fits within a UK ladies size 8, 7, 6, 5 or 4 shoe.

[0068] As an alternative to providing the insole with

one or more markings a template which can be employed to indicate where the insole should be cut to provide a predetermined configuration which will allow it to fit within an article of footwear having a particular size may be provided. The template may be a paper template. The template may be provided with one or more markings to indicate where it should be cut to provide a predetermined configuration in which its peripheral edge is such that it will fit within an article of footwear having a particular size. The template may then be held against the insole and the insole cut to size using the template as a guide once a user is happy the template is correctly sized.

[0069] According to a second aspect of the present invention there is provided a closed article of footwear comprising an upper and a sole forming a foot chamber therebetween wherein the sole comprises a sole component comprising a toe portion and a heel portion connected by an arch portion and comprises at least one compressible passage extending between a first portion of the sole component and a second portion of the sole component, which passage is arranged to have an opening into a first region of the foot chamber and an opening into a second region of the foot chamber such that, in use, air can be caused to travel from said passage into a second region of the foot chamber, by a pumping effect caused by compression of the passageway along at least a part of its extent during a stage of a wearers walking cycle.

[0070] Suitably, the sole component comprises a sole component according to the first aspect. Suitably, the sole component comprises an insole. Suitably, the insole is removable. Suitably, the sole comprises an outer sole and a sole component comprising an insole. Suitably, the sole further comprises a midsole. The article of footwear may comprise a boot, shoe or trainer.

[0071] Suitably, in use, when a wearer is walking and/or running with a normal gait the portion of at least one passage in the heel portion of the sole component is compressed as a wearers foot (in the footwear) strikes the ground. As the wearer rocks their foot forward to continue walking their weight may move along the sole component toward the toe portion thereof. Accordingly, the portion of the passage in the arch region and then subsequently the toe region of the sole component may be compressed while the heel portion of the passage and then subsequently the arch region of the passage may expand to their former configuration.

[0072] Air in the passage in front of the compressed portion may thus be forced along and out of the passage into the toe region of the foot chamber.

[0073] As weight is moved along the sole component toward the toe air may be drawn into and along the passage from the heel region of the foot chamber.

[0074] Shortly before a wearers foot leaves the ground, suitably only the end of the toe region of the passage is compressed. When a user's foot is removed from the ground the passage is suitably fully uncom-

pressed and may be filled with air. That air may be almost entirely drawn from the heel region.

[0075] When a user's foot contacts the ground once again the process may be repeated. Thus, cooler and/or dryer air from the heel of the foot chamber may be effectively supplied to the toe region to displace warmer and/or damper air therefrom.

[0076] Air from the toe region may circulate within the foot chamber to the heel region and/or it may be expelled from the foot chamber through a breathable upper of the footwear.

[0077] The air drawn into the sole component at the heel region of the foot chamber may comprise air circulated to the heel region from the foot region of the chamber. Suitably, such circulated air may cool the foot during circulation to the heel region. Alternatively, or in addition the air drawn into the sole component at the heel region of the foot chamber may comprise fresh air drawn into the foot chamber. The fresh air may be drawn into the foot chamber through a breathable upper of the footwear. Alternatively, or in addition, the fresh air may be drawn into the foot chamber via a gap between a wearers heel and ankle and the upper of the footwear.

[0078] Suitably, the circulation of air around the wearers foot and in particular around the toes may reduce problems associated with closed footwear and may improve a wearers comfort.

[0079] According to a third aspect there is provided a method of manufacturing a sole component according to the first aspect.

[0080] Suitably the method comprises forming a sole component by an extrusion process.

[0081] According to a fourth aspect there is provided a method of manufacturing an article of footwear according to the second aspect.

[0082] Suitably the method comprises forming a sole component by an extrusion process.

[0083] According to a fifth aspect there is provided a kit of parts comprising:

(i) two insoles

(ii) instructions for cutting the insoles to each fit an article of footwear of a specific standard size

wherein the insoles are as described in the first aspect.

[0084] The kit may further comprise a template to be employed to indicate where an insole should be cut to fit an article of footwear of a specific standard size.

[0085] The present invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a sole component;

Figure 2 is a plan view of a sole component showing hidden detail;

Figure 3 is a cross-sectional view along line A-A of Figure 2;

Figure 4 is a cross-sectional view along line B-B of Figure 2;

Figure 5 is a cross-sectional view of an alternative sole component corresponding to the view along line A-A of Figure 2;

Figure 6 is a plan view of an article of footwear showing hidden detail;

Figure 7 is a cross-sectional view along line C-C of an article of footwear;

Figures 8a-d show cross-sectional views of an article of footwear along line C-C at various stages of a walking cycle.

[0086] As illustrated by Figures 1 to 4 a first embodiment of a sole component comprises an insole 1 arranged to fit within an article of footwear 2.

[0087] The insole 1 comprises a plurality of silicone rubber tubes 10 having passageways 11 therethrough, arranged side by side and bonded together. Most of the tubes 10 are arranged to extend between a heel portion 20 and a toe portion 30 via an arch portion 40. Each of the passageways 11 of these has a first opening 21 at the peripheral edge 22 of the heel portion 20 and a second opening 31 at the peripheral edge 32 of the toe portion 30. Owing to the shape of the insole some tubes 10 and thus passageways 11 do not extend from the heel portion 20 to the toe portion 30. Such tubes can though still perform an active role as will be discussed hereinafter.

[0088] The insole 10 is sized such that it will fit a UK mens size 11 shoe. It is provided with markings 15, 16, 17 indicating where it should be cut to provide an insole that will fit a UK mens size 10, 9 or 8 shoe.

[0089] The insole can be cut to shape using a pair of scissors.

[0090] In an alternative embodiment (not illustrated) the sole component comprises an insole which comprises a plurality of compressible tubes defining passageways. Adjacent tubes are spaced apart from one another and the tubes are connected by bridging walls. Otherwise the alternative embodiment may substantially correspond to that of Figures 1 to 4.

[0091] Each bridging wall extends from the equator of one tube to the equator of an adjacent tube. The insole is produced by extrusion such that the bridging walls and tubes are integral. The axis of adjacent tubes of the insole are spaced a distance of $nd/2$ from one another (where d is the tube diameter). The separation between the tubes may provide greater space into which the tubes may deform in use. The sole component may thus be compressible to a substantially flat form.

[0092] As illustrated by Figure 5 an alternative embodiment of the sole component comprises an insole 1. The insole 1 is substantially the same as that of the first embodiment in Figure 2 but the passageways 11 are not defined by tubes 10. Instead, the insole comprises a first silicon rubber sheet 50 spaced from a second silicon rubber sheet 60 by silicone rubber walls 70. The walls 70 extend in the heel to toe direction and separate the space between the first and second sheets 50, 60 into a plurality of passageways 11.

[0093] In each of the embodiments the insole 1 is deformable such that one or more of the passageways 11 can be compressed, in use, by the weight of a user's foot.

[0094] Figure 6 is a plan view of an article of footwear 2, namely a shoe which shows the hidden detail of the outline of the inner face 81 of the upper 80 and the outline of the insole's peripheral edge 12. In the embodiment shown the insole 1 comprises a removable insole as shown in Figure 1.

[0095] As shown by Figures 6 and 7, the insole 1 is shaped such that there is a space between the openings 21, 31 of the passageways 11 and the upper 80. Thus, there is a clear air flow path between a heel region 91 of the foot chamber 90 (formed between the upper 80 and the sole 100) and the passageways 11 of the insole 1. There is also a clear air flow path between a toe region 92 of the foot chamber 90 and the passageways 11 of the insole 10.

[0096] The sole 100 comprises an outer sole 101, a midsole 102 and the insole 1.

[0097] In use, one or more of the passageways is compressed by the weight of a wearer's foot as they walk or run and air is expelled from the compressed passageway(s) via openings 31 into the toe region 92 of the foot chamber 90.

[0098] The intended operation, which is produced by a wearer having a normal gait, is illustrated by Figures 8a to 8d.

[0099] As a wearer's foot 3 within the footwear 2 first engages the ground 4 (Figure 8a) the heel 103 contacts the ground 4. The heel portion 20 of the insole 1 is thus compressed between the wearer's heel and the midsole 102. One or more passageways (only one shown) 11 are thus compressed and air expelled therefrom as shown by arrow D.

[0100] As the wearer carries on walking the ball 104 of the sole 100 contacts the ground (Figure 8b). The user's weight shifts within the footwear 2 such that the arch portion 40 of the insole 1 is compressed expelling more air from the passage 11 as shown by arrow D. As weight begins to lift off the heel portion 20 the passageways 11 in that portion return to their former configuration and air is drawn in as shown by arrow E.

[0101] With continued walking as shown by Figure 8c the user's weight shifts such that the toe portion 30 of the insole 1 is compressed expelling more air from the passageway 11 as shown by arrow D. The portion of the

insole 10 behind the area to which the weight of the foot is applied expands and the passageways 11 in that portion regain their former configuration and draw in more air as shown by arrow E.

[0102] When the foot and footwear are moved through the position shown by Figure 8c the tubes in the toe region 30 which, due to the insoles shape, extend from the peripheral edge 32 of the toe portion only as far as the arch portion 40 and not to the heel portion 20 (Figure 2), also perform an active role. Air is expelled from the tubes 10 passageways 11 via openings 31 and drawn into them via openings 21.

[0103] When a user lifts their foot off the ground as shown by Figure 8d the passageways 11 are fully expanded and filled with air.

[0104] Thus, when a user's foot next contacts the ground the process is repeated.

[0105] The present invention may thus provide a sole component for ventilating an article of footwear simply and reliably. It may also provide a sole component which is economical and can be fitted to existing footwear.

[0106] Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this specification, and the contents of all such papers and documents are incorporated herein by reference.

[0107] All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

[0108] Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

[0109] The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

Claims

1. A footwear sole component comprising a toe portion (30) and a heel portion (20) connected by an arch portion (40), the sole component being arranged, in use, to form a part of a sole of a closed article of footwear (2) having a foot chamber (90), wherein the sole component comprises at least one compressible passage (11) extending between a

first portion of the sole component and a second portion of the sole component, which passage (11) is arranged, in use, to have an opening into a first region of the foot chamber (90) and an opening into a second region of the foot chamber (90) such that air can be caused to travel from said passage (11) into a second region of the foot chamber (90), by a pumping effect caused by compression of the passage (11) along at least a part of its extent during a stage of a wearers walking cycle.

2. A sole component according to Claim 1, wherein the sole component comprises an insole (1).

3. A sole component according to Claim 2, wherein the sole component has a thickness of 10mm or less and can be cut to size.

4. A sole component according to any preceding claim, wherein the sole component is arranged such that, in use, air can be caused to travel from the first region of the foot chamber (90) to the second region via at least one passage (11) therein.

5. A sole component according to any preceding claim, wherein the first portion of the sole component comprises a heel portion (20) thereof and the second portion of the sole component comprises a toe portion (30) thereof.

6. A sole component according to any preceding claim, wherein the sole component comprises a plurality of passages (11).

7. A sole component according to any preceding claim, wherein the or each passage (11) has substantially the same cross section throughout its extent.

8. A sole component according to any preceding claim, wherein at least one of the or each passage (11) is arranged to be compressed by the weight of part of a wearer's foot (3) acting on the passage (11) during a stage of the wearers walking cycle.

9. A sole component according to any preceding claim, wherein the or each passage (11) is able to provide an active pumping action when compressed at any point along its longitudinal extent.

10. A sole component according to any preceding claim, wherein the or each passage (11) is arranged, in use, to convey air to a second region of a foot chamber (90) by means of a peristaltic pumping action.

11. A sole component according to any preceding claim, wherein the sole component does not com-

prise any pumping means in addition to the one or more passages (11).

12. A closed article of footwear (2) comprising an upper (30) and a sole (100) forming a foot chamber (90) therebetween wherein the sole (100) comprises a sole component comprising a toe portion (30) and a heel portion (20) connected by an arch portion (40) and comprises at least one compressible passage (11) extending between a first portion of the sole component and a second portion of the sole component, which passage (11) is arranged to have an opening into a first region of the foot chamber (90) and an opening into a second region of the foot chamber (90) such that, in use, air can be caused to travel from said passage (11) into a second region of the foot chamber (90), by a pumping effect caused by compression of the passage (11) along at least a part of its extent during a stage of a wearers walking cycle.

13. An article of footwear (2) according to Claim 11 wherein the sole component comprises a sole component according to any of Claims 1 to 11.

14. A method of manufacturing a sole component according to any of Claims 1 to 11, which method comprises forming a sole component by an extrusion process.

15. A method of manufacturing an article of footwear (2) according to Claim 12 or 13, which method comprises forming a sole component by an extrusion process.

16. A kit of parts comprising:

(i) two insoles (1)

(ii) instructions for cutting the insoles to each fit an article of footwear (2) of a specific standard size wherein the insoles comprise insoles according to any of Claims 2 to 11.

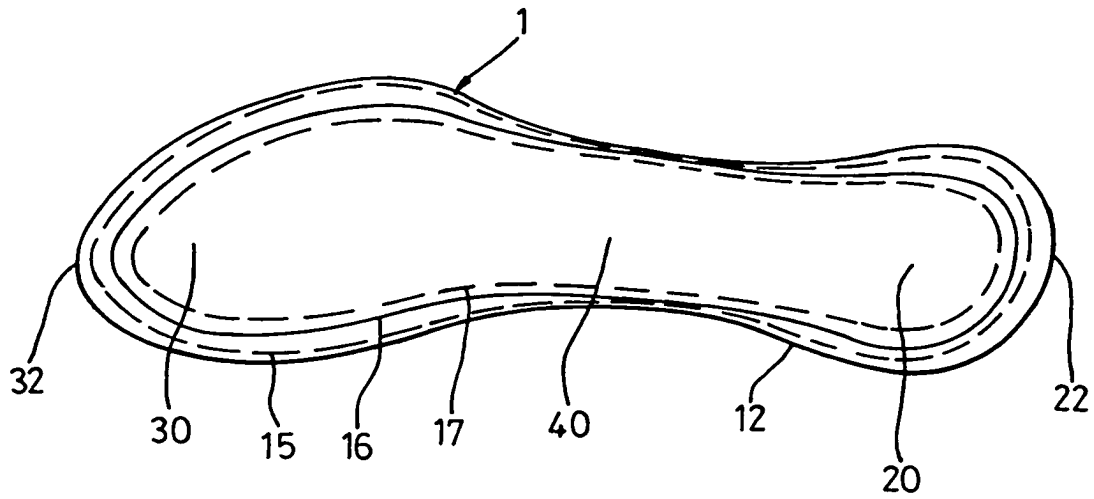


Fig. 1

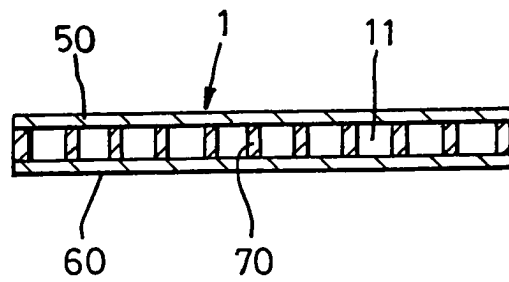


Fig. 5

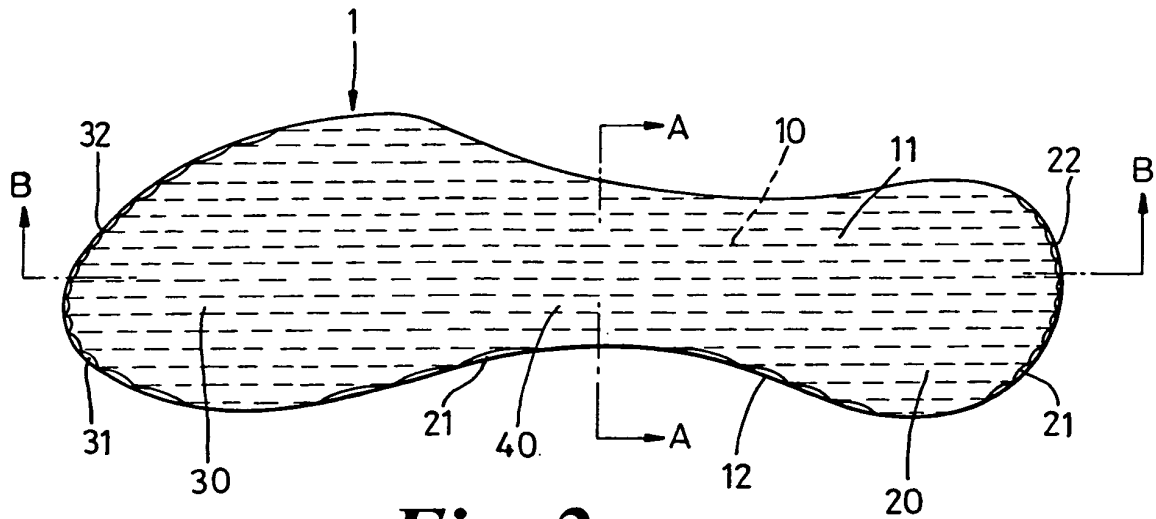


Fig. 2

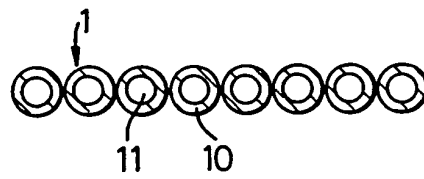


Fig. 3

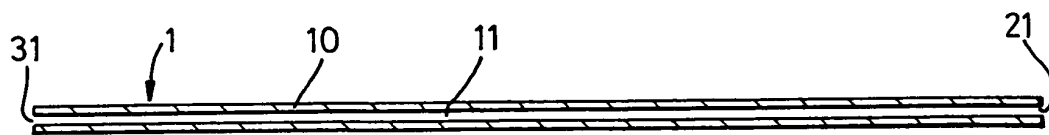


Fig. 4

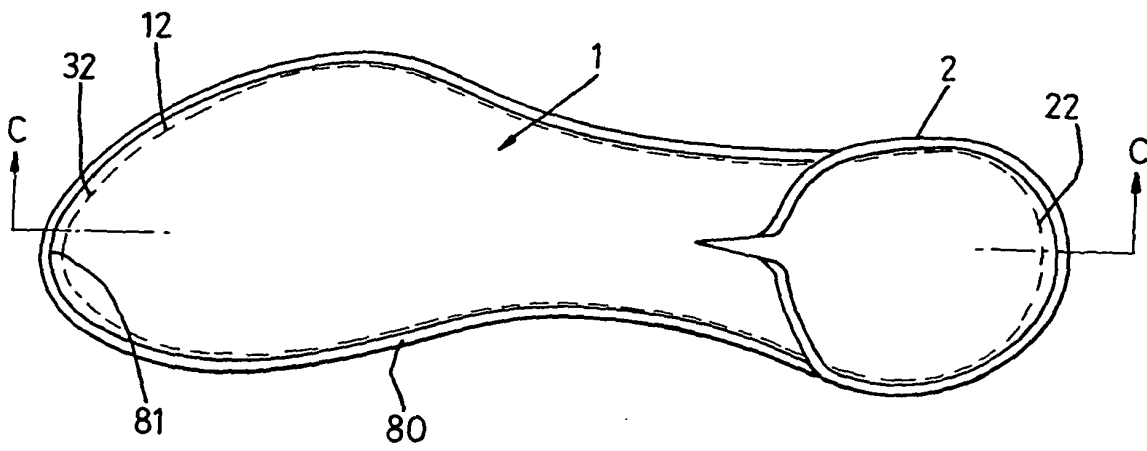


Fig. 6

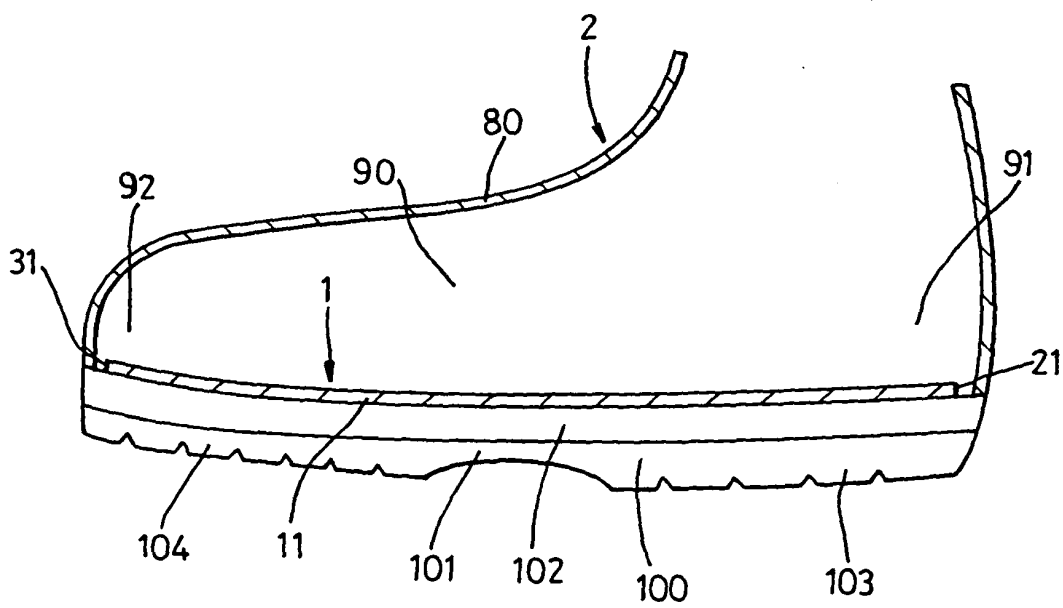


Fig. 7

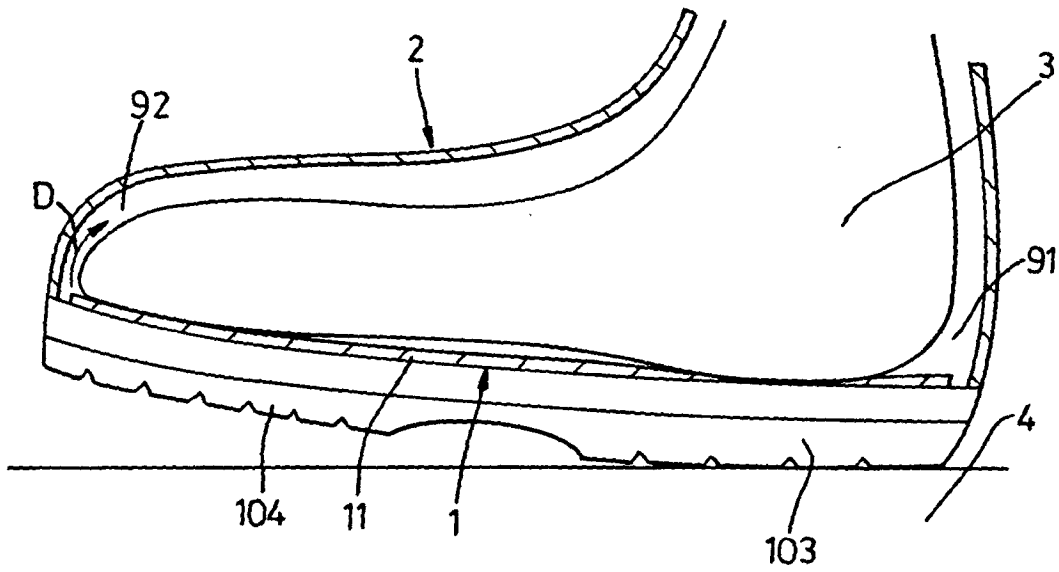


Fig. 8a

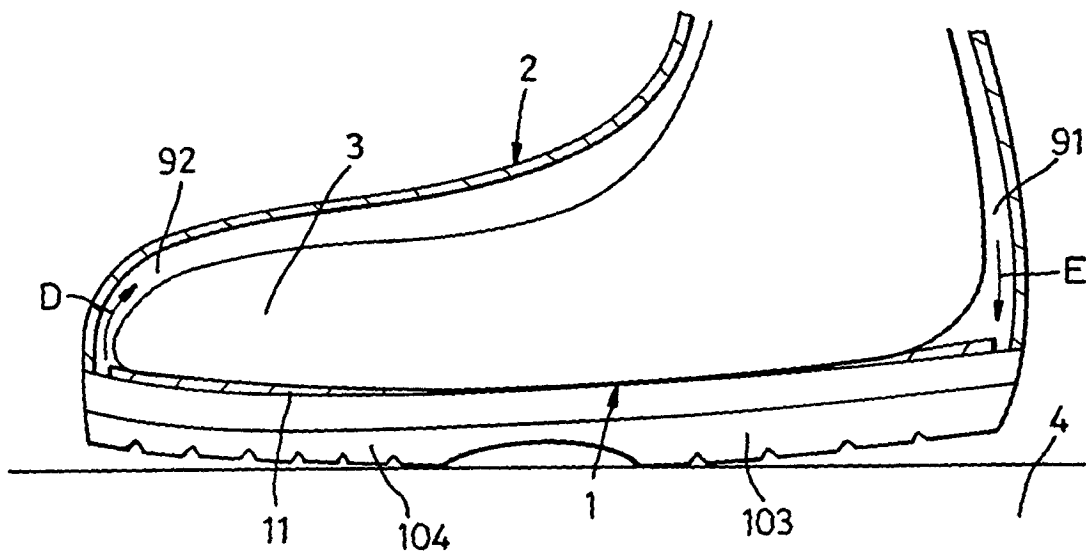


Fig. 8b

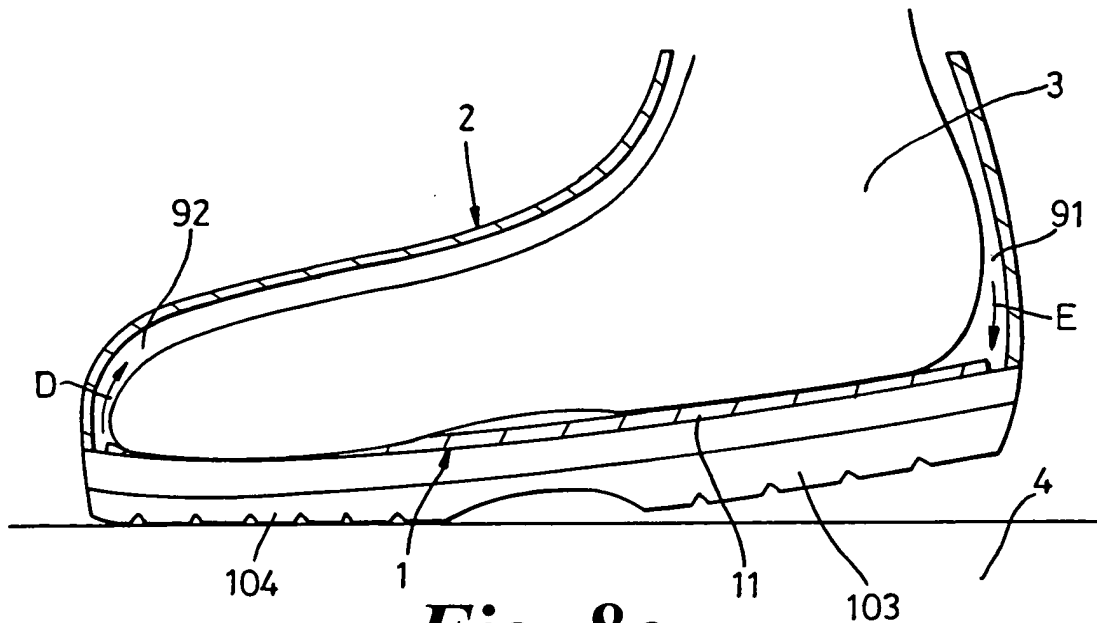


Fig. 8c

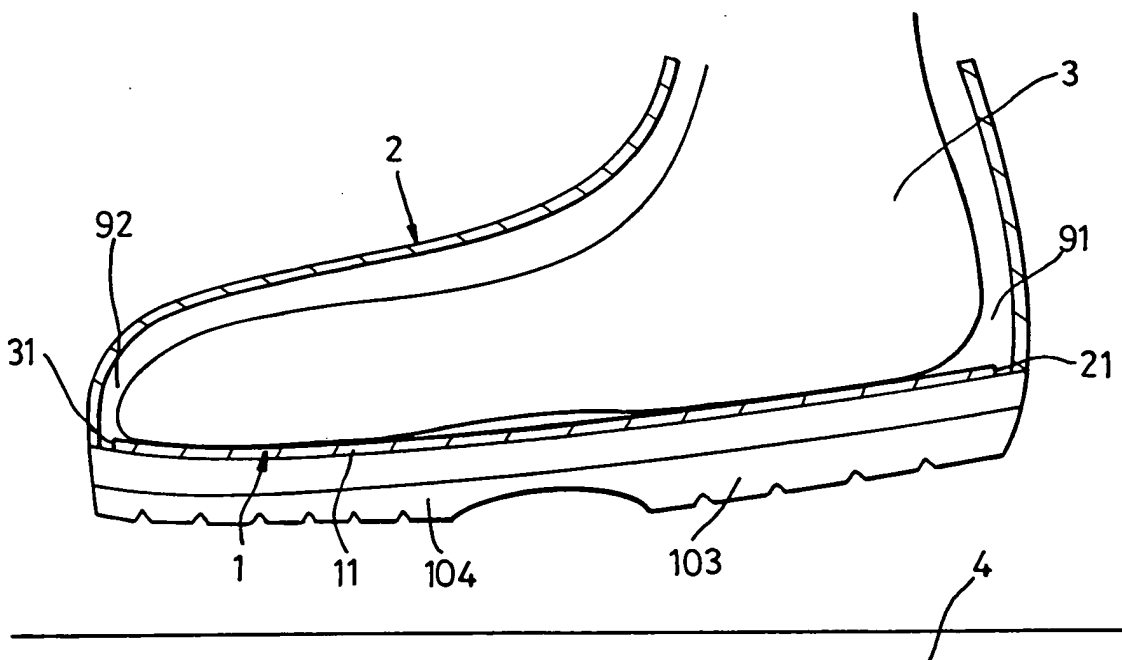


Fig. 8d