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(54) **The insole**

(57) The invention relates to the insole (1) provided, from the upper side, with a shaping corresponding to the

form of impression of bottom part of a human foot. The bottom side (100) of the insole (1) has a form of bottom part of a human foot with smooth toe section.

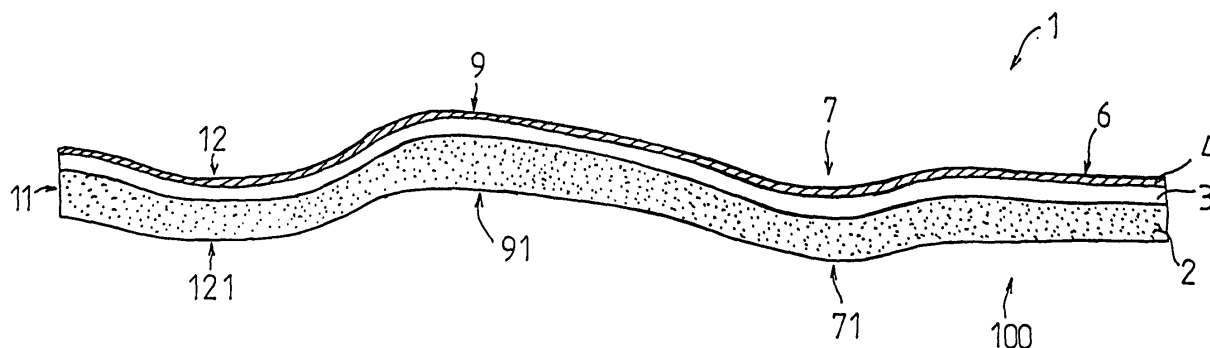


Fig. 7

Description

Technical field

[0001] The invention relates to the insole provided, from the upper side, with a shaping corresponding to the form of impression of bottom part of a human foot.

Background art

[0002] At present, several different types of inserting or stretching insoles are used, which should in a most comfortable and suitable manner act upon the human foot, to render it the most ideal support, and in some cases also to stimulate some of the ceptors on the sole. These shoemaker's products may be then generally divided into two groups, which differ in their structure and a manner how they act upon the human foot.

[0003] First of all these are the insoles or bottom leathers, which contain a layer of a suitable deformable material (e.g. cork), which during usage temporarily or permanently accommodates to the shape of user's foot. The solution according to DE 3406504 belongs to representatives of this group, where the insole besides others comprises a layer formed by a cork pulp with a soft binding, which during wearing adjusts to the form of a bottom section of user's foot. Also JP 2001299408 deals with a similar solution, where one of the insole layers is made of cork, which after a longer wearing adjusts to the form of bottom sole of the foot. Nevertheless both these solutions have their disadvantages when to the most substantial belongs the fact that if the user has a foot which is formed unsuitably, e.g. the flat-foot, or treads fully on one's foot in an unsuitable manner etc., the insole shapes itself so that at a further usage it impairs this defect instead to improve the quality of user's tread.

[0004] Another way how to adjust the insole to the form of a human foot is to create a relief on an upper surface of the insole which is in contact with a human foot, which by its form and arrangement rather corresponds to the form of the sole. The solution according to GB 1491489 or according to JP 7039402 belongs among such solutions, when a surface of the insole, which is in contact with the user's foot, is shaped by means of a system of protrusions and dimples. The disadvantage of such solutions is that these insoles are shaped in accordance with a unified form of human foot, hence disregarding an individual shaping, which features especially in a diversity of forms and inclination of toes so that in this case the toes of a foot adjust to the structure of the insole while it should happen, in fact, vice versa.

[0005] The structure of insoles of both described types results in that during their usage - during walking, but also during sporting - all the muscles of lower limbs are not engaged ideally, neither the weight of a human body is not distributed ideally between the toe joint, little toe joints and the heel bone. In these points of foot supports created on the insole the foot is supported in a fixed man-

ner. At a healthy man with normally shaped foot this leads to an excessive loading of some muscles or ligaments of a foot, thus to atrophy and shortening of other not used muscles, to an excessive loading of the toe joint, and in some cases also to an injury of vascular system in a transversal and longitudinal instep of the bottom sole of a foot, the result of which is not only an abnormal tiredness, but also further physical, possibly even psychic problems, that become worse with the age.

[0006] The goal of the invention is to reduce or totally eliminate the shortcomings of the previous state of the art and to produce an insole enabling to the user a walking similar to the walking with a bare foot on a sand, grass or earth regardless the real shape of bottom part of user's foot, this means both for the user with normally formed foot as well as for a user with a foot which is transverse, longitudinally or totally flat.

The principle of invention

[0007] The goal of the invention has been achieved through the insole according to the invention, whose principle consists in that the bottom side of the insole has a form of bottom part of human foot with a smooth toe section. Such shaping of bottom side of the insole which in fact is negative to shaping of the upper side of the insole, ensures a quality guiding, position and support of foot sections subjected to fully treading and springy supporting of soft sections of the foot, i.e. the longitudinal and transversal instep. At the same time it reduces energetic demand of walking.

[0008] The toe section of the insole with advantage is smooth from both sides, as shaping of upper side of the insole in its toe section is not necessary from the point of view of walking comfort of the user.

[0009] Simultaneously it is advantageous, if the bottom side of the insole contains in the heel section a protrusion arranged under the heel dimple of upper side of the insole, the heel protrusion on the bottom side of the insole from the outer side of the insole is delimited by deflection of the cuboid bone arranged under the support of the cuboid bone on the upper side of the insole, the heel protrusion on the bottom side of the insole continues in a protrusion of longitudinal splint bone arranged under the dimple of longitudinal splint bone on the upper side of the insole, the protrusion of longitudinal splint bone on the bottom side of the insole in the front continues in a protrusion of little toe joints arranged under the dimple of little toe joints on upper side of the insole, the protrusion of little toe joints on the bottom side of the insole passes through deflection of a support of transversal instep towards the inner section of insole into the protrusion of toe joint arranged under the dimple of toe joint on the upper side of the insole, while the support of transversal instep creates a springy bridge between the section of the insole under the toe joint and under the little toe joints, and towards the heel this support continues in a support of longitudinal instep, which from the bottom side is cre-

ated by a deflection of support of longitudinal instep arranged under the protrusion of support of longitudinal instep on the upper side of the insole.

[0010] Shaping of bottom section of the insole in an above mentioned manner contributes to a flexible supporting of soft parts of the foot and in a case of higher physical effort it does not strain the foot in a place of support by an excessive force acting upon the soft parts of the foot.

[0011] For a correct distribution of weight of the user on the foot it is advantageous if the height of protrusion of little toe joints is smaller than the height of protrusion of the toe joint. At the same time a greater depth of dimple of the toe joint could be achieved when compared with the depth of dimple of little toe joints with respect to the upper surface of the insole.

[0012] For an easy formation of the insole shaped according to the invention it is advantageous if the bottom side of the insole is formed by a carrying part, in which the shaping is created and on whose upper side there is arranged the cover layer.

[0013] At the same time it is economic advantageous, if the carrying part of the insole is formed by the cork moulding.

[0014] To further increase the user's comfort, it is advantageous, if between the carrying part and cover layer at least one dilatation layer is inserted.

Description of the drawing

[0015] An example of insole embodiment according to the invention is schematically shown on attached drawings, where the Fig. 1 shows a ground plan of the insole, the Fig. 2 a cross section II-II of the insole according to the Fig. 1, the Fig. 3 shows a cross section of the insole III-III according to the Fig. 1, the Fig. 4 a cross section IV-IV of the insole according to the Fig. 1, the Fig. 5 shows a cross section V-V of the insole according to the Fig. 1, the Fig. 6 a cross section VI-VI of the insole according to the Fig. 1, the Fig. 7 a longitudinal section VII-VII of the insole according to the Fig. 1, the Fig. 8 a longitudinal section VIII-VIII of the insole according to the Fig. 1, and the Fig. 9 shows a section of the dilatation layer in an alternative embodiment.

Examples of embodiment

[0016] The embodiment of the insole will be explained on the example of embodiment of an independent inserting insole, nevertheless in other not illustrated examples of embodiment its principle may be applied also e.g. at the structure of a stretching insole.

[0017] The insole 1 in its ground plan (Fig. 1) by its shape and the size is similar to the shape and size of a human foot.

[0018] From the Fig. 2 to the Fig. 8 it is obvious that the insole 1 in the illustrated example of embodiment is formed by three layers of material. The bottom side of

the insole 1 is formed by a carrying part 2, on which the dilatation layer 3 is arranged, on which is deposited the covering layer 4 forming the contact part of the insole 1. In the illustrated and described example of embodiment the covering layer 4 is formed by a natural leather.

[0019] Carrying layer 2 of the insole in an advantageous execution is formed by a pressed cork, whose particles are mutually connected by a binder, nevertheless in other examples of execution it may be further made of other currently used materials, which to the carrying part 2 of the insole and due to this to the whole insole 1 impart the ability to absorb impacts arising during walking, and it guarantees a shape stability of carrying part 2 of the insole.

[0020] Shaping of the insole 1 is performed in its carrying part 2. The dilatation layer 3 and covering layer 4 along the whole surface of the insole are of the same thickness. The carrying part 2 in the toe section of the insole is smooth without shaping both from the upper as well as bottom side of the insole 1. On its upper side the front section of the insole 1 is formed by a plane supporting surface 6 for support of foot toes, which towards the heel 11 of the carrying part 2 continuously merges into the dimple 7 of the toe joint, whose size and shape correspond to the size and shape of a toe joint of a human foot, and into the dimple 8 of little toe joints, whose size and shape correspond to the size and shape of joints of remaining toes of a human foot, while the shape of the dimple 8 of little toe joints is close to the shape of the L letter. The dimple 7 of toe joint and the dimple 8 of little toe joints are created by a concave deflection of a corresponding section of the carrying part 2. In some not illustrated examples of embodiment the dimple 8 of little toe joints is replaced by several dimples, being shaped separately for each joint of other toes of a human foot or, e.g. for pairs of these joints, etc. Because of an arrangement of the toe joint and joints of other toes on the bottom surface of a human foot, the dimple 7 of the toe joint is positioned with respect to the tip 5 of the insole 1 higher than the dimple 8 of little toe joints, while the dimple 7 of the toe joint is deeper, and with the dimple 8 of little toe joints is interconnected through an elastic support 78 of transversal instep, which is performed by a continuous heightening of their common edge being shaped according to the transversal instep of a human foot.

[0021] The lower part of dimple 7 of the toe joint, the inner edge of dimple 8 of the little toe joints and between them positioned support 78 of transversal instep merge continuously into the support 9 of longitudinal instep, which is performed by a convex deflection of a corresponding section of the carrying part 2, while the shape and dimension of the support 9 of longitudinal instep are selected with respect to the longitudinal instep of a human foot.

[0022] The dimple 8 of little toe joints further merges in its lower part through the elastic support 810 of the splint bone performed by a continuous heightening of a common edge into the dimple 10 of the splint bone,

whose size and shape are derived from the size and shape of longitudinal splint bone of a human foot. The dimple 10 of the splint bone is formed by a concave deflection of a corresponding section of the carrying part 2, and it is arranged along the support 8 of longitudinal instep, into which it continuously merges along its whole length.

[0023] In vicinity of the heel 11 of carrying part 2 by another concave deflection there is performed the heel dimple 12, shaped with respect to the heel bone of the foot, while the heel dimple 12 merges in the upper section by means of elastic support 1012 of the heel bone, which is performed by a continuous heightening of a common edge, into the dimple 10 of the splint bone, and at the same time it continuously merges into the support 9 of longitudinal instep.

[0024] In the space between the heel dimple 12 and the dimple 10 of the splint bone, from the edge of carrying part 2 there extends the support 13 of cuboid bone, which is formed by a convex deflection of the carrying part 2, while the groundplan shape of the support 13 of cuboid bone is close to a triangle, whose peak merges into the support 1012 of the heel bone.

[0025] The bottom side 100 of the carrying part 2 of insole is shaped negatively with respect to its upper side, so that on the bottom side there is performed a relief whose shape corresponds to the shape of bottom surface of a human foot without toes.

[0026] The bottom side 100 of insole 1 contains in the heel section 11 the heel protrusion 121 arranged under the heel dimple 12 of upper side of the insole 1. The heel protrusion 121 on the bottom side of the insole 1 from the outer section of the insole 1 delimited by the deflection 131 of cuboid bone arranged under the support 13 of cuboid bone on upper side of the insole 1. The heel protrusion 121 on bottom side of the insole 1 merges into the protrusion 101 of longitudinal splint bone arranged under the dimple 10 of longitudinal splint bone on upper side of the insole 1. The protrusion 101 of longitudinal splint bone on bottom side of the insole 1 in front merges into the protrusion 81 of little toe joints arranged under the dimple 8 of little toe joints on upper side of the insole. The protrusion 81 of little toe joints on bottom side of the insole 1 transfers through deflection 781 of the support 78 of transversal instep towards the inner section of the insole 1 into the protrusion 71 of the toe joint, arranged under the dimple 7 of the toe joint on upper side of the insole 1. The support 781 of transversal instep forms a flexible bridge between the section of insole 1 under the toe joint and under the little toe joints and towards the heel this support continues into the support 9 of longitudinal instep, which from the bottom side of the insole 1 is formed by deflection 91 of support 9 of longitudinal instep arranged under the protrusion of the support 9 of longitudinal instep on the upper side of the insole 1.

[0027] On bottom side of the insole between the protrusion 81 of little toe joints and the longitudinal protrusion 101 of splint bone there is created the deflection 8101 of

the support 810, which forms a flexible transfer between the section of the insole under the little toe joints and the section of insole under the splint bone. Between the protrusion 101 of the splint bone and the heel protrusion 121 there is performed a deflection of the support 1012, which forms a flexible transfer between the section of the insole 1 under the splint bone and the section of insole 1 under the heel. All supports performed on the insole 1 in a flexible manner support the respective section of the foot, while they are deformable and due to this they do not act upon the soft parts by an excessive force and do not cause deformations of these parts of foot even at an increased loading, not even at pathologic status and deformations of the foot, which prevents occurrence of ischaemic focuses of soft tissue of the foot.

[0028] Thickness of the carrying part 2 of the insole within the whole surface of the insole 1 is constant with the exception of the sphere of support 9 of longitudinal instep, in which in a suitable way a thickness of the carrying part 2 of the insole 1 is increased, which increases strength of the insole 1 in section of the support 9 of longitudinal instep, and as a result of this also the strength, by which the support 9 supports the longitudinal instep.

[0029] The height of protrusion 81 of little toe joints is smaller than the height of protrusion 71 of a toe joint. Through this a greater depth of the dimple 7 of toe joint is reached when compared with depth of the dimple 8 of little toe joints with respect to the upper surface of the insole, and a correct weight distribution of the user of insole is achieved.

[0030] On the upper side of the carrying part 2, there is applied the dilatation layer 3, which is with the basic layer joined in a fixed manner - e.g. by bonding. The dilatation layer 3 is made of a flexible, easily deformable material, while after a certain period of usage it forms into a suitable shape, corresponding to a shape of a respective sole of a human foot. In further examples of embodiment the deformability of the dilatation layer 3 and simultaneously service life of shoemaker's product is increased by performance of air chambers on a surface of dilatation layer 3, which adjoins to an upper side of the carrying part 2, while these air chambers, which are mostly of a round-head shape extend into the material of carrying layer 2, and cause that deformation of the dilatation layer 3 is a temporary one and after relieving the dilatation layer 3 gets its original shape. In illustrated example of embodiment the dilatation layer 3 is formed by two layers of flexible material, while the air chambers 33 are performed in lower dilatation layer 31, and they are closed by the upper dilatation layer 32. Thickness of the dilatation layer 3 is within the whole surface of the insole 1 constant, so that the dilatation layer 3 deposited on upper side of the carrying part 2 is copying its surface and it is shaped in the same way as its upper side.

[0031] On the dilatation layer 3 there is further deposited the cover layer 4, whose task besides the drainage of moisture, which is originated during wearing inside the

footwear, is to render a comfort contact with user's foot, while the material of cover layer 4 meets these requirements, and with advantage it is the natural leather. Thickness of the cover layer 4 within the whole surface of the insole 1 is constant, so that it is copying the surface of dilatation layer 3 and of the carrying part 2.

[0032] In the non illustrated example of embodiment there are passing through the layers of footwear product, especially in the area of the support 9 of longitudinal instep, the perforations, that increase moisture drainage and enable circulation of air through the shoemaker's product, especially the independent inserting insole.

[0033] At some advantageous embodiments on the free lower surface of the carrying part 2 there is applied an absorption layer, whose task is to drain the moisture from other layers of shoemaker's product and to increase the comfort at its usage.

Applicability

[0034] The insole according to this invention could be used for a common outdoor footwear, working footwear and especially winter footwear. Next to this, it can be used in a health footwear and sports footwear, possibly in footwear for professional drivers.

List of referential marking

[0035]

1	insole
100	bottom side of the insole
2	carrying part
3	dilatation layer
31	lower dilatation layer
32	upper dilatation layer
33	air chambers
4	cover layer
5	tip
6	supporting surface for support of toes
7	dimple of the toe joint
71	protrusion of the toe joint
78	support of transversal instep
781	deflection of support of transversal instep
8	dimple of the little toe joints
81	protrusion of the little toe joints
810	support of the splint bone
8101	deflection of support of the splint bone
9	support of longitudinal instep
91	deflection of support of longitudinal instep
10	dimple of the splint bone
101	protrusion of the splint bone
1012	support of the heel bone
111	heel
12	heel dimple
121	heel protrusion
13	support of the cuboid bone
131	deflection of support of the cuboid bone

Claims

1. The insole provided, from the upper side, with a shaping corresponding to the form of impression of bottom part of a human foot, **characterised by** that the bottom side (100) of the insole has a form of bottom part of a human foot with smooth toe section.
2. The insole according to the claim 1, **characterised by** that the toe section of the insole (1) is smooth from both sides.
3. The insole according to the claim 1 or 2, **characterised by** that the bottom side (100) of the insole in the heel section contains a heel protrusion (121) arranged under the heel dimple (12) of upper side of the insole, the heel protrusion (121) on the bottom side of the insole from the outer side of the insole is delimited by deflection (131) of the cuboid bone arranged under the support (13) of the cuboid bone on the upper side of the insole, the heel protrusion (121) on the bottom side of the insole continues in a protrusion (101) of longitudinal splint bone arranged under the dimple (10) of longitudinal splint bone on the upper side of the insole, the protrusion (101) of longitudinal splint bone on the bottom side of the insole in the front continues in a protrusion (81) of little toe joints arranged under the dimple (8) of little toe joints on upper side of the insole, the protrusion (8) of little toe joints on the bottom side of the insole passes through deflection (781) of a support (78) of transversal instep towards the inner section of insole into the protrusion (71) of toe joint arranged under the dimple (7) of toe joint on the upper side of the insole, while the support (78) of transversal instep creates a springy bridge between the section of the insole (1) under the toe joint and under the little toe joints, and towards the heel (11) this support (78) continues in a support 8 of longitudinal instep, which from the bottom side of the insole is created by a deflection of support of longitudinal instep arranged under the protrusion of support (91) of longitudinal instep on the upper side of the insole.
4. The insole according to the claim 3, **characterised by** that the height of protrusion (81) of little toe joints is smaller than the height of protrusion (71) of the toe joint.
5. The insole according to any of the claims 1 to 4, **characterised by** that the bottom side (100) of the insole is formed by a carrying part (2), in which the shaping is created and on whose upper side there is arranged the cover layer (4).
6. The insole according to the claim 5, **characterised by** that the carrying part (2) is formed by the cork moulding.

7. The insole according to the claims 5 or 6, **characterised by** that between the carrying part (2) and the cover layer (4) there is inserted at least one dilatation layer (3). 5
8. The insole according to the claim 7, **characterised by** that the dilatation layer (3) is made of a flexible material. 10
9. The insole according to the claim 8, **characterised by** that the dilatation layer (3) contains the air chambers (33). 15
10. The insole according to the claim 9, **characterised by** that the dilatation layer (3) is formed by two layers of a flexible material, while the air chambers (33) are performed in the lower dilatation layer (31), and they are closed by the upper dilatation layer (32). 20

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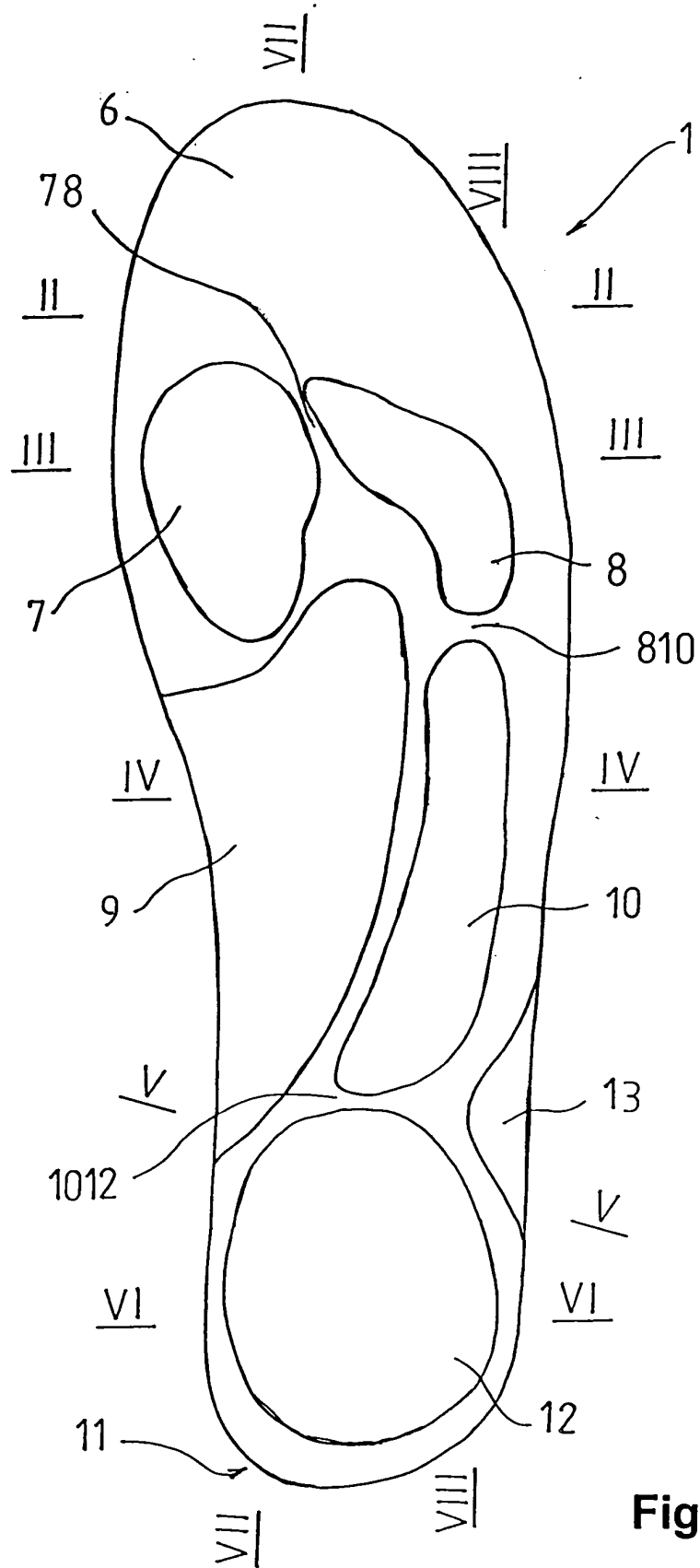
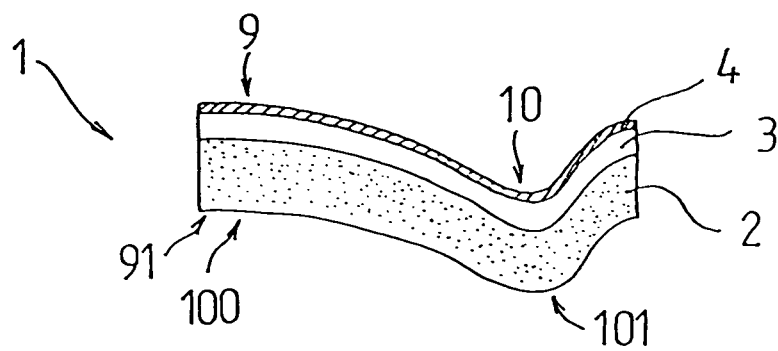
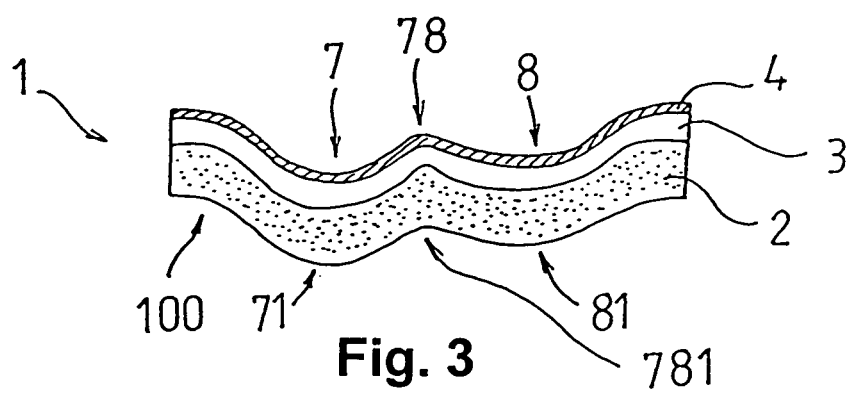
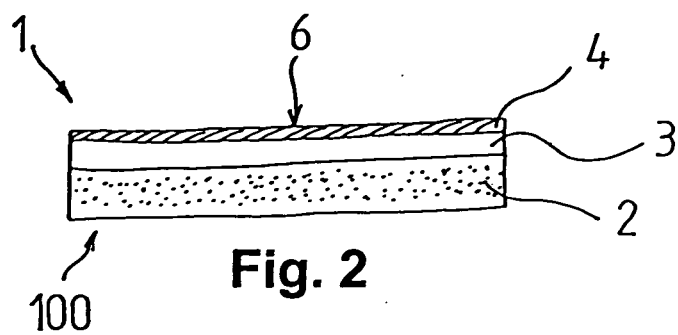


Fig. 1



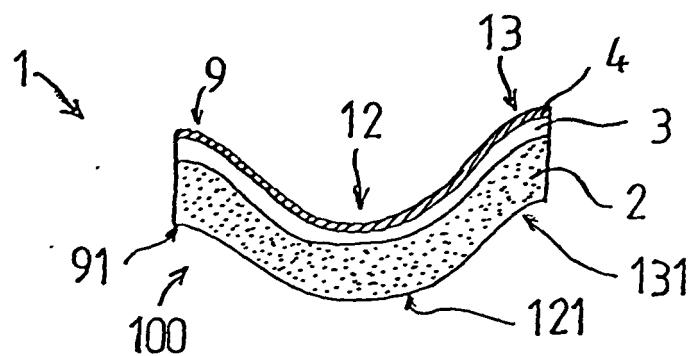


Fig. 5

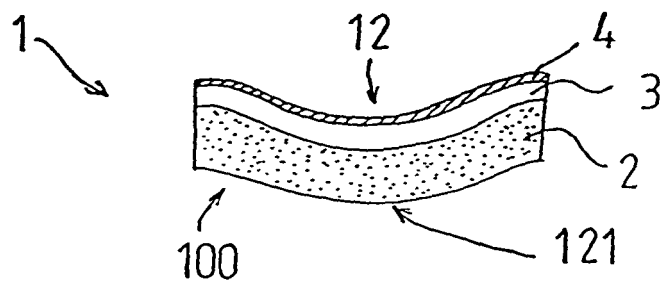


Fig. 6

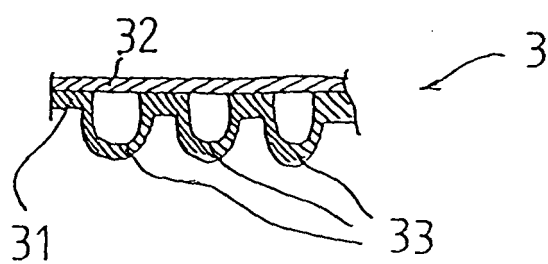


Fig. 9

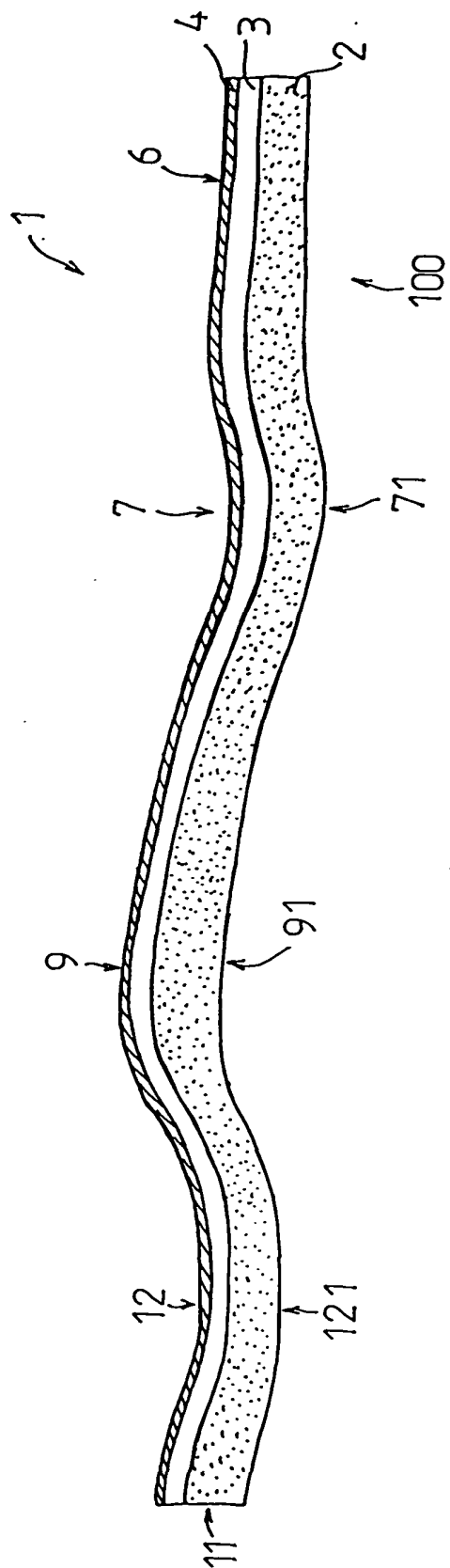


Fig. 7

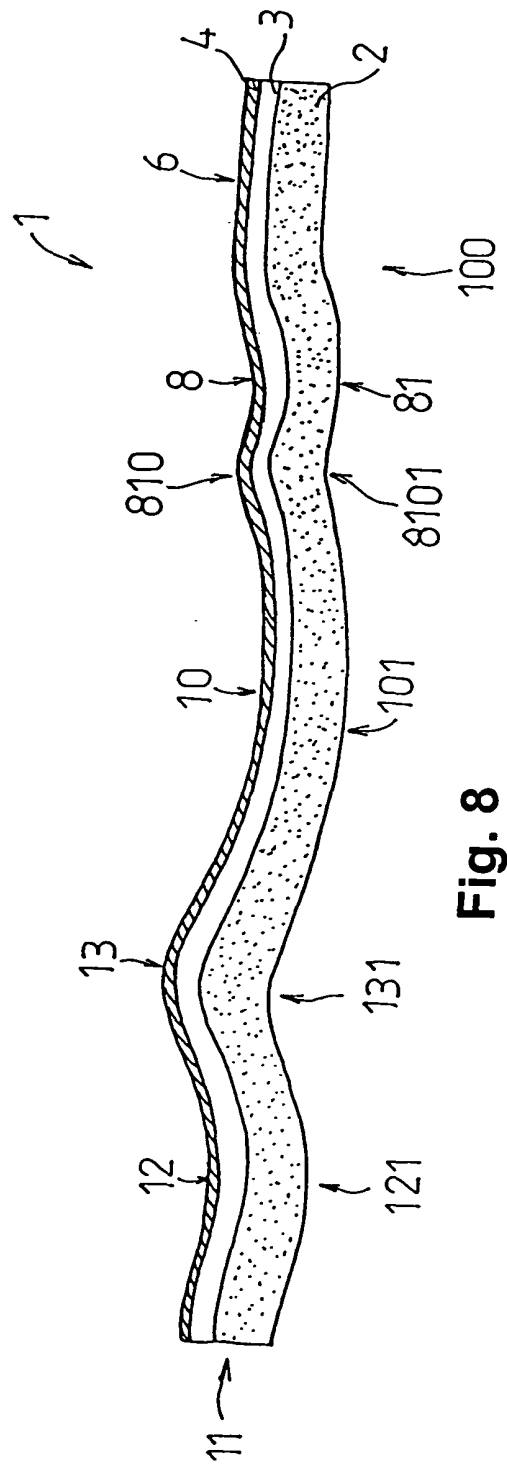


Fig. 8



European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 46 6013

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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 19 September 2007	Examiner Claudel, Benoît
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 46 6013

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