INSOLE FOR SHOES

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Abstract

An inner sole (1) has a base sole (2) which consists of a foamed material layer. A cover layer (20) is deposited over the material layer (10, 30). Whilst the foamed material layer (10, 30) has a hardness of preferably between 10° and 20° Shore A, by way of the cover layer (20) one achieves an inner sole (1) which as a whole has a hardness between 30° and 40° Shore A. The foamed material layer may be of latex and/or polyurethane foam.

The inner sole with the material pairing shown here provides for excellent massage or acupressure effects and may be designed for the targeted effect on individual body organs or regions, without effecting an over-stimulation.
The present invention relates to an inner sole with a flat base sole of elastic foam material which corresponds to the outline of a shoe and which on its upper side in the region of reflex zones of the foot sole comprises several integrally formed projections, likewise of elastic foam material.

The term inner sole is to be understood on the one hand as an inner sole rigidly connected to a sole of a shoe, as well as an inner sole which is laid loosely thereon, which is also called an inlay sole. Inner sole is a more general term under which insoles and cover soles are also to be understood.

Inner soles which are provided with suitable projections for reflex zone massage are known in the most varied of embodiment forms. The plurality of such inner soles have a napped contact surface arranged over the whole surface, wherein the surface structure of the inner sole is formed by the entirety of the naps. Inner soles of this type are for example shown in EP 0 225 285 and U.S. Pat. No. 4,760,655 A. While in the latter case as with CH 686,062 A the nap height is designed constant over the whole surface of the inlay sole, other inner soles such as for example according to WO 85/04786 are formed with naps whose height varies and which accordingly practically form a foot bed. Inner soles of this type practically always effect an over-stimulation of the sole of the foot, with which the desired foot reflex zone massage no longer shows the desired effect. On the contrary, the over-stimulation leads to blockages of nerve lines and to injurious consequences. The providers of these correctly point out that such footwear should only be worn for 1-2 hours.

With regard to the manufacture of inner soles with projections of elastic foam material there are known two design principles. In one case one proceeds from a harder base sole and cushion-like projections are adhered onto this. This is an extremely complicated and expensive way of manufacture. This way of manufacture is for example known from the already mentioned U.S. Pat. No. 4,760,655 A. So that the projections still achieve an effective massage effect, they must project relatively greatly with respect to the base surface. On account of the napped cover layer which is attached thereon and extends over the whole inner sole, in an undesired manner the massage is perceived greater in the harder, non-raised regions than in the raised regions.

From DE-90/02962.3 there is known an inner sole forming the preamble of the patent claim 1. With this the base sole and the projections are manufactured integrally as one unit of a foam material with a hardness of 30° to 45° Shore A. This inner sole is preferably manufactured of plastic. It may be arranged as an inlay sole as well as an inner sole. With this known inner sole, the base sole as well as the projections are manufactured of a preferably synthetic material. As a natural product, latex classically has a hardness of Shore A of 10-20. Although it may be set to greater hardnesses, this on the one hand however makes the product more expensive and on the other hand the admixing is partly physiologically undesirable.

A soft and effective foot reflex zone massage would be achieved best of all if it were possible to provide an inner sole which is soft in its perception, with a certain sinking depth and a sufficient spring depth so that hard knocks are transmitted to the sole of the foot in a reduced manner via reflex zone massage points.

It is therefore the object of present invention to provide an inner sole of the above mentioned type whilst preventing the previously mentioned disadvantages, and with a simultaneous attainment of the above-described effect.

This object is achieved by an inner sole with the features of the patent claim 1. Thanks to the combinatory selection of the materials with the suitable hardness there results a product with excellent physiological properties which furthermore may be simply manufactured.

If one uses leather for manufacturing the cover layer, then on the one hand the desired total hardness may be set very well and furthermore a most excellent connecting material combination is achieved. Further advantageous embodiment forms are to be deduced from the dependent claims and their manner of acting and significance is explained in the following description. In the drawings there is shown a preferred embodiment example of the subject-matter of the invention and this is explained in detail in the subsequent description. There are shown in

![Figure 1](image1.png)

**FIG. 1** A view of the inner sole according to the invention, with projections in the region of reflex zone of the foot sole in one arrangement, which is suitable for influencing the head region and the sensory organs and

**FIG. 2** A similar view of an inner sole with projections in the region of reflex zones of the sole of the foot, which is suitable for influencing the circulation.

**FIG. 3** shows an enlarged cross section through the inner sole along line A-A in FIG. 1. In

**FIG. 4** there is shown a cross section through one variant of an inner sole outside the region of the projections, according to a section along the line B-B in FIG. 2 and in

**FIG. 5** the same sectioned representation of another material combination.

**FIGS. 6-11** show inner soles with the most different of projection formations for the targeted influencing of various reflex zones for having an effect on corresponding organs or body regions.

The inner sole as a whole is indicated with the reference numeral 1. It consists of a flat base sole 2 of elastic foam material, in the present case of latex or polyurethane. On the upper side of the flat base sole 2 there are recognisable several projections 3 which are manufactured as one piece with the base sole 2, consist of the same material and are thus integrally formed. These projections 3 are located in the known regions of reflex zones of the foot sole. The projections 3 are shaped such that laterally they run upwards in an inclined manner and have a central level surface 5. Between the central plane 5 and the non-raised surface of the base sole 2 there are located the circumferential, lateral inclinations 4. This manner of shaping has the purpose of not only having the effect that the inner sole serves for massaging the reflex zones whilst walking, but also in the condition of rest achieves an acupressure effect, which acts in a particularly gentle manner.
The projections do not at all need to have a circular shape but may, as is shown in FIG. 2, have any other design shapes. In particular the projections may also be linear. Such a linear projection 6 is shown in FIG. 2. The linear projection has an apex line which runs at a constant height. In the normal case all projections project upwards beyond the surface of the base sole 2 to the same extent.

The base sole 2 consists of a foamed elastic material layer, here of a latex layer 10 and a rigidly connected cover layer 20 arranged thereon. The foamed material layer has a hardness of 10°-20° Shore A. On account of the relatively low thickness of the latex layer 10 which in the regions without projections is between 1.5 and 4.0 mm, the relatively large hardness differences occurring with latex have a great effect. Amongst other things this is because the pore size may vary locally. These differences also remain when a latex with a greater Shore hardness is used. According to the invention a material pairing is now suggested which largely redresses these differences and as a whole leads to a clearly definable hardness, which corresponds to the desired properties. In contrast to known soles with which only in the regions of the reflex zones are there attached projections of soft cushion material, there arises as a whole a better damped sole in comparison to that which is known which has extreme hardness differences in the region of the projections and in the regions next to the projections.

The basic thickness of the latex layer, or of the foamed material layer may here have practically any thickness thanks to the combination with a cover layer. In this case with the selection of the thickness with inner soles which are rigidly connected to the shoe material, one would rather select a thicker design, with inlay soles one would rather select a thinner design. Basically however with a greater thickness of the inner sole, the absolute height of the projections must be larger in order to compensate the sinking.

It has been shown to be particularly advantageous to form the cover layer of leather. In this case on the one hand a great flexibility is desired in order to ensure the movability of the surface of the whole inner sole 1 and on the other hand the adhering between the foamed material layer, e.g. latex layer 10 and the cover layer 20 should be able to be achieved where possible with a physiologically harmless adhesive. This may also be achieved with the use of leather as a cover layer. At the same time it is particularly advantageous to manufacture the cover layer of split leather. Split leather is not only of interest with regard to price, but it has the advantage of a constant thickness over the whole surface and a particularly uniform softness on touch. On manufacture, split leather forms extremely well on the contour of the manufacturing shapes. This also permits one to accordingly shape the height of the projections in the foamed material layer one or twice the thickness outside the regions of the projections. Also with split leather one may also practically arbitrarily set the optimal thickness ratio between the foamed material layer and the cover layer. Accordingly therefore the desired total hardness of the inner sole may be set to a few degrees Shore A hardness. According to the invention the setting is effected to a hardness which lies between 30° and 40° Shore A.

With the more exclusive designs one would however rather use the more expensive upper leather and accordingly have a selection of leather of various hardness in stock.

Whilst until now inner soles have been manufactured of a single material which had the desired end hardness or however there were provided material pairings which were seen over the whole surface resulted in regions of different hardnesses, the invention now for the first time specifies a solution with which the setting of the hardness is effected of two materials which over the whole surface of the base sole 2 alone are each constant, but with their pairing yield a desired end hardness which does not correspond to the hardness of one of the two materials. In this case the material selection is advantageous from an ecological as well as economical point of view. One may use a relatively thin layer of latex and in this case select a latex with a relatively deep thickness and correspondingly low Shore A hardness which is obtainable on the market accordingly inexpensively, and on the other hand use a split leather which permits a good setting of the material pairing.

The foamed material layer may, as mentioned, be manufactured of polyurethane foam. Here one would preferably select a degree of hardness similar to a natural latex foam. It is however also possible to manufacture the foamed material layer of two material plies, as this is shown in FIG. 4 and 5.

A thin latex layer 10 as well as a cover layer 20 of leather for example have a water vapour permeability measured according to DIN 5333 of 6.9 mg/cm². This means that the sole according to the invention permits a relative good adsorption of sweat. The sole furthermore has an air permeability of 8.5 l/min at 0.01 bar. As a result the inner sole according to the invention permits the sweat to escape overnight. These desired effects however also mean a relatively low heat insulation. According to the invention this may be drastically reduced in that one incorporates a layer of foamed polyurethane below the latex layer or one manufactures the whole foamed layer of this material. Trials have shown that for this an anti-bacterially and anti-fungicidally treated polyurethane with the description Sanitized® PUR 99-45 is particularly suitable. This material is offered in Switzerland by the company Clarant Huningue SA in France. With this it is the case of a material with a hardness of 20 to 24 Shore C, measured analogously to the method according to DIN 53505. This polyurethane layer with a thickness of 4-7 mm produces an excellent heat insulation. The total effect of the sole with regard to its mass effect or acupressure effect remains inspite of the relatively soft polyurethane layer 30.

Below the foamed layer which may be single-ply or two-ply, with the use as an integratable sole one would preferably incorporate a texon®, granulated cork or cellu-lose layer 40. This layer 40 is relatively hard. It may simultaneously serve as an insole for assembling shoe uppers.

The relative hardness of the layer 40 mechanically protects the inner sole with regard to unevennesses of the shoe sole inner side. It thus serves as part of the insole.

With the selection of the two-ply inner sole of the combination of latex and polyurethane one would preferably laminate the latex layer over the polyurethane layer. Even when one uses a Sanitized® PUR 99-45 as a polyurethane foam, the anti-bacterial and anti-fungicidal effect is realised through the latex foam layer.

Apart from the embodiments according to the FIGS. 1 and 2 various other projection formations for the
targeted influencing of various reflex zones for effecting the corresponding organs or body regions are conceivable. Whilst until now practically only inner soles with a generally applicable arrangement of the projections were usual, inner soles with the design according to the invention may be manufactured better and more precisely and therefore for the first time a whole series of inner soles with a targeted influencing of certain organs or body regions are offered for selection. Thus FIG. 6 shows an arrangement of the projection which influences the lower back, FIG. 7 an arrangement which effects the sexual organs and FIG. 8 an arrangement with which one influences the foot reflex zones which have an effect on the spinal region. FIG. 9 is an inner sole which serves for influencing the shoulder girdle and pelvic region, whilst FIG. 10 discloses an arrangement for influencing the digestive organs. Finally in FIG. 11 there is shown an inner sole for having an effect on the vegetative nerve system.

[0029] On account of the over-stimulation effected by inner soles common today, such inner soles could not be offered without at the same time having to take possible injuries into account.

[0030] List of Reference Numerals

[0031] 1 inner sole

[0032] 2 flat base sole

[0033] 3 projections

[0034] 4 lateral inclination

[0035] 5 central plane

[0036] 6 linear projection

[0037] 10, 30 material layer

[0038] 10 latex layer

[0039] 20 cover layer

[0040] 30 polyurethane layer

[0041] 40 cellulose layer

1. An inner sole (1) with a flat base sole (2) of elastic foam material which corresponds to the outline of a shoe and which on its upper side in the region of reflex zones of the foot sole comprises several integrally formed projections (3), likewise consisting of the same elastic foam material, characterised in that the sole is integrally manufactured out of a foamed material layer (10, 30) which has a hardness of below 25° Shore A, in particular between 10° and 20° and is rigidly provided with a smooth cover layer (20) so that the hardness of the laminated inner sole has a hardness of over 25° Shore A, in particular between 30° and 40° Shore A.

2. An inner sole according to claim 1, characterised in that the foamed material layer (10, 30) is manufactured of latex, polyurethane foam or texon®.

3. An inner sole according to claim 1, characterised in that the foamed material layer (10, 30) is manufactured two-ply of two different materials.

4. An inner sole according to claim 3, characterised in that the upper of the two plies (10) is manufactured of latex and the lower ply of polyurethane foam (30).

5. An inner sole according to claim 1, characterised in that the cover layer (20) is manufactured of leather, split leather, breathing-active plastic material or textile material.

6. An inner sole according to claims 1, characterised in that the thickness of the foamed material layer (10, 30) in the region without projections (3) corresponds at least twice or maximally four times the thickness of the cover layer (20).

7. An inner sole according to claim 1, characterised in that height of the projections (3) corresponds to once or twice the material layer (10, 30) outside the regions of the projections.

8. An inner sole according to claim 1, characterised in that the thickness of the material layer (10, 30) in the region outside the projections (3) is between 1.5 mm and 4.0 mm.

9. An inner sole according to claim 1, characterised in that there are present flat projections which have a lateral inclination (4) and a central level surface (5).

10. An inner sole according to claim 1, characterised in that there is present at least one linearly (6) extending projection with an apex line at a constant height.

11. An inner sole according to claim 1, characterised in that the layer foamed of polyurethane (30) contains antibacterial and anti-fungal active ingredients.

12. An inner sole according to claim 11, characterised in that the layer foamed of polyurethane consists of “Sanitized® polyurethane 99-45” (description Clariant Hünigse SA, France).

13. An inner sole according to claim 1, characterised in that the projections (3) are arranged in such formations that a targeted influencing of various reflex zones for an effect only on selected organs or body regions may be achieved (FIGS. 1, 2 and 6-11).