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(54) Outsole for a sports shoe such as a tennisshoe

(57) An outsole (1) for a sports shoe such as a tennis shoe consists of elastically deformable material and has sole profiling formed by recesses (2) in the ground-engaging side of the outsole. The bottom (8) of each recess (2) carries at least one projection (3) which projects towards the ground-engaging side of the outsole. Provided on the side of the bottom which is remote from the ground-engaging side of the outsole is a free space (12) into which the bottom can be displaced under loading, by virtue of elastic deformation of the part of the bottom which surrounds the projection in the respective recess. In the non-deformed condition of the bottom the projection does not project beyond the ground-engaging side of the outsole.

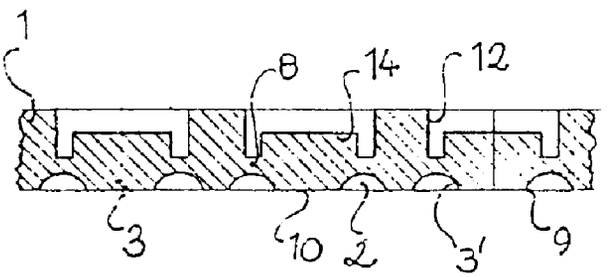


Fig. 2

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Description

FIELD OF THE INVENTION

The invention concerns an outsole of elastically deformable material for a sports shoe such as a tennis shoe.

BACKGROUND OF THE INVENTION

Shoes such as tennis shoes and other sports shoes which are intended for use on relatively hard playing surfaces cannot generally have gripping elements which project downwardly from the ground-engaging side of the outsole of the shoe, as such gripping elements cannot or should not penetrate into the playing surface when a weight is applied to the shoe. This applies for example in regard to sports shoes which are intended for sports and games which are performed indoors on hard surfaces such as wooden floors and the like. The outsole of such a shoe frequently has cup-shaped recesses which perform a kind of suction cup function. This consideration also applies however to sports shoes which are intended to be used outdoors, for example and more specifically tennis shoes for use on sand courts because in that situation outsoles which are provided with shaped projecting bodies on the ground-engaging side of the outsole can excessively dig up and damage the playing surface.

Shoes intended for use in situations like those outlined above may therefore be provided with a sole profiling in the form of a multiplicity of recesses in the ground-engaging side of the outsole, in order thereby to enhance the non-slip nature of the outsole.

While outsoles which have sole profiling in the form of projecting gripping elements to enhance the non-slip nature of the shoe may suffer from the problem of a reduction in non-slip capability and shoe grip due to the gripping elements becoming clogged for example with dirt, this is a problem which arises to a much greater extent in the case of an outsole with a sole profiling in the form of recesses in the ground-engaging side of the outsole, as soon as the recesses have become clogged with dirt or sand. For, in that case, the accumulations of dirt or other matter in the recesses form a substantially continuous smooth surface, with the remainder of the surface of the ground-engaging side of the outsole. The recesses can then no longer perform their gripping function, as the gripping effect of such a sole is afforded by the edges of the recesses being intended to come into positive gripping engagement with the surface on which the shoe is used.

In order to maintain the grip afforded by an outsole, various attempts have been made to design the outsole profiling in such a way that a self-cleaning effect occurs, in other words, any dirt or sand or the like which has become accumulated in the sole profiling is automatically removed again therefrom. In one such outsole design, disposed above the cup-shaped recesses in the outsole, on the side thereof that is towards the foot of the person wearing the shoe, are respective pressure bodies. When the outsole is loaded by the weight of the wearer of the shoe, the pressure bodies deform the bottoms of the associated recesses in a downward direction and thereby eject therefrom any dirt which has collected in the recesses. This configuration can be found in DE-U-93 02 067.

In another outsole, as can be seen in US patent specification No 1 559 450, the profiling on the ground-engaging side of the outsole is in the form of suction cups, formed by projections in the form of circular rings. Projecting from the bottom of each of those suction cups is a respective peg which projects beyond the edge of the circular rings. The intention with that configuration is that the pegs can loosen any dirt which has penetrated into the suction cups and remove same, by virtue of the bending and deformation effects occuring when the pegs are subjected to a loading in use of the shoe. It has been found however that the desired self-cleaning effect is only highly incomplete while in addition that outsole is not suitable for sports shoes which are to be used both in the open air and also on relatively smooth and possibly hard surfaces.

SUMMARY OF THE INVENTION

An object of the present invention is to provide an outsole for a shoe such as a sports shoe and more especially a tennis shoe which affords an improved self-cleaning effect without thereby adversely affecting the grip of the outsole.

A further object of the present invention is to provide an improved outsole for a sports shoe which enjoys universal suitability for use on smooth and rough surfaces with a good gripping action and a self-cleaning effect.

Still another object of the present invention is to provide an outsole of elastically deformable material for a sports shoe which enjoys good grip by virtue of a suction cup-like effect while exhibiting a self-cleaning action.

In accordance with the present invention the foregoing and other objects are achieved by an outsole of elastically deformable material for a sports shoe such as a tennis shoe, with a sole profiling in the form of a plurality of recesses in the ground-engaging side of the outsole. At least one projection is connected to the bottom of each recess, the projection projecting towards the ground-engaging side of the outsole. The part of the bottom surrounding the projection in each recess is elastically deformable whereby the bottom can be pressed into a free space disposed thereabove. In the non-deformed condition of the bottom of the recess the projection does not project beyond the ground-engaging side of the outsole.

It will be appreciated that the term ground-engaging side is used here to denote the side of the outsole which in use is intended to engage the ground and is therefore the side of the outsole which in the normal position of use faces downwardly.

As will be seen from an embodiment of the invention described in greater detail hereinafter, the invention is primarily based on the realization that deformation, which occurs under the effect of a loading applied to the outsole, of the peg projecting from the bottom of a suction cup in the sole profiling, as in the above-described prior construction, is not adequate to displace therefrom dirt which has penetrated into same to a significant degree. This applies in particular in regard to sole profilings which involve a multiplicity of recesses on the outsole, as such recesses are then necessarily small and the pegs are then of correspondingly small size and experience scarcely any deformation such as to remove dirt from the recess. In the case of the outsole in accordance with the invention however the projection performs significant upward and downward movements under the alternating loading applied to the outsole in use thereof, even if the projections are of very small dimensions, because the bottom of each recess is designed in the manner of an elastic diaphragm which, with a suitable loading applied to the projection, can move into the free space disposed above the above-mentioned diaphragm portion. When the loading on the projection and therewith the diaphragm portion ceases again, more specifically when the wearer of the shoe having the outsole in accordance with the invention lifts the foot off the ground, the bottom of the recess, which constitutes the diaphragm portion, causes the projection to move back into its starting position again and in so doing displaces out of the recess any dirt which has penetrated into same. As the length of the projection does not exceed the depth of the recess, that is to say the projection does not project downwardly beyond the edge of the recess, there is only a slight tendency on the part of the projection to be held fast at the peripheral surface of the recess, by dirt which has penetrated into same. Even the end face of the projection which passes into the recess as a result of a loading applied to the outsole acts as a kind of piston causing dirt to be ejected from the recess when the projection is returned into its initial position by the movement of the bottom of the recess.

The upward and downward movement of the projection, which is necessary to produce the self-cleaning effect and which is guaranteed by the bottom of the recess which can move in a diaphragm-like manner can always be sufficiently large, substantially irrespective of the size of the recesses, by virtue of a suitable choice in respect of the thickness of the bottom of each recess. The essential consideration in regard to mobility of the bottom of each recess is the space disposed thereabove . The space can be formed by a suitable opening on the side of the sole layer having the profiling, being the side which is towards the foot of the person wearing the shoe on which the outsole is used. Alternatively, the outsole may be of a multi-layer structure comprising the sole layer having the sole profiling and a further sole layer disposed thereabove. Openings may be provided on the underneath side of the further sole layer, corresponding to the recesses in the layer of the sole which has the sole profiling.

In a preferred feature of the invention the recesses are of a cup-like configuration and each contain only one respective projection. It is however also possible for more than one projection to be arranged in a correspondingly larger recess. In that case, at least the bottom region of the recess, which immediately adjoins those projections, is elastically deflectable and stretchable in a diaphragm-like manner.

In addition to the edge of the recess, the end edge of each projection also engages into the court or playing surface with a positively locking engagement if the end face of the projection is substantially flat and is flush with the ground-engaging side of the outsole. This increases the gripping capability of the outsole, in comparison with a profiling which involves just cup-shaped recesses. It has been found however that, if the end of the projection is rounded off or curved, that can afford a markedly increased amount of grip, in comparison with just ordinary recesses. Therefore, a considerable self-cleaning effect is achieved even in the case of relatively shallow recesses in which the projection is substantially in the form of a shallow dish or a lens-like portion.

The above-indicated mode of operation of the profiling of the outsole according to the invention presupposes that the sole material is an elastically deformable material such as rubber or rubber-like material. In principle in that respect however it is possible for the projection to be made from a relatively hard and substantially non-deformable material as the important consideration, in regard to the desired mode of operation, is only the elastic deformability of the bottom of each recess in the region which surrounds or adjoins the respective projection. In this case it is necessary for the projection to be connected to the bottom of the respective recess in a suitable fashion, for example by being formed directly thereon in an injection-molding process. Preferably however the projection is formed integrally with the bottom of the respective recess and from the same material as the outsole itself. A further possible configuration provides that the diaphragm-like bottom of each recess is formed by a thin elastically deformable sole layer which carries the projections and which is fixed on the top side of the sole or wearing layer which has the recesses. In this case the recesses are through holes which extend through the wearing layer and which for example can be formed therein by stamping. To achieve elastic deformation of the respective bottom of the recesses, it is necessary for that purpose that the sole layer having the projections is joined in surface contact throughout to the top side of the wearing layer, in order thereby to produce the local deformation and resulting upward and downward movements of the bottom of the respective recesses.

Further objects, features and advantages of the present invention will be apparent from the following description of a preferred embodiment.

BRIEF DESCRIPTION OF THE DRAWING

Figure 1 is a view from below of an outsole according to the invention,

Figure 2 is a partial view in section taken along line II-II in Figure 1 on an enlarged scale, and

Figure 3 is a sectional view similar to that shown in Figure 2 of a slightly modified embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring firstly to Figure 1, an outsole for a sports shoe such as a tennis shoe, which is generally identified by reference numeral 1, has on its ground-engaging side or underneath side a multiplicity of cup-shaped recesses 2 which have circular rims and which in their center contain a projection 3 which is also circular in cross-section. The projection 3 thus constitutes a kind of short peg in the recess 2. In the illustrated embodiment the entire ground-engaging side of the outsole is occupied by approximately 120 recesses 2, of which however the drawing clearly shows only the recesses 2 which are disposed in the ball region 4 of the foresole portion, the recesses disposed on the rearsole 5, and some recesses which are to be found in the arch region 6. The further recesses 2 which are disposed at positions other than the above-indicated areas of the outsole are only diagrammatically indicated. The illustrated configuraiton is intended to express the fact that complete occupation of the outsole 1 with recesses 2 is conceivable, but preferably it is only the ball region 4 and the heel region 5 of the outsole that are provided with group-like arrangements of recesses 2 in the illustrated manner, with for example about 50 recesses 2 on the foresole portion. The remaining part of the ground-engaging side of the outsole which is of less significance in regard to the grip afforded by the sole by virtue of the lower level of loading applied thereto can in this case be substantially smooth. In the illustrated embodiment the recesses are of a diameter of about 10 mm and a depth of between about 1 and 1.5 mm.

As can be seen from the view on an enlarged scale and in section in Figure 2, the wall of each recess 2 extends inwardly in a toroidal configuration and forms a bottom 8 which surrounds in an annular configuration the projection 3 which projects therefrom towards the ground-engaging side of the outsole. The peripheral surface 3' of the projection 3 extends the wall of the recess 2, also in a toroidal configuration, and extends to a relatively sharp edge 9 at the end face 10 of the projection 3, which is at the ground-engaging side of the outsole.

Formed in the outsole 1 on the side thereof which is towards the foot of the wearer of the shoe in which the outsole 1 is fitted are openings 12, disposed at locations corresponding to the respective recesses 2 on the ground-engaging side of the outsole 1. The openings 12 extend into the outsole 1 to such an extent that the annular bottom 8 of each recess 2 is of relatively small thickness, being here for example 1 mm. A respective abutment body as indicated at 14 projects from the side of the bottom 8 that is towards the foot, into the free space formed by the recesses 12. The height of the abutment body 14 constitutes approximately half the depth of the opening 12.

In the illustrated embodiment the outsole 1 comprises rubber or a rubber-like material and the recesses 2, the openings 12 and the projections 3 and abutment bodies 14 respectively provided therein are formed integrally with the outsole 1.

The end faces 10 of the projections 3, which are disposed in one plane with the surface of the ground-engaging side of the outsole 1, form a not inconsiderable part of the ground-engaging side of the outsole 1. When the sports shoe fitted with this outsole 1 is used on a hard smooth surface such as the floor of an indoor sports hall or arena therefore the end faces 10 are involved in the frictional engagement with the floor surface, that affords the grip of the outsole 1. When the sports shoe is used on rough ground, for example on the sand surface of a tennis court or the like, the desired gripping capability of the sole profiling is achieved by virtue of the fact that, as a result of the relative softness and roughness of the surface on which the shoe is used, said or earth passes into the recesses 2 and that gives rise to a kind of positive locking engagement with the surface, with the edges of the recesses 2 and the edges 9 of the end faces 10 of the projections 3 digging into the playing surface. In addition, the projections 3 of at least a majority of the recesses 2 are displaced inwardly by virtue of the respective projections 3 being suspended in an elastically yielding manner on the annular bottom 8 of the respective recess. The part of the outsole 1, which surrounds each of the respective recesses 2 and which, in comparison with the respective projection 3, is substantially non-yieldingly supported at the sole layer (not shown) which is disposed thereabove, is in contrast deformed in a compression mode to a lesser degree. The extent of penetration of the projection 3 into the associated recess 2 is determined predominantly by the elastic stretchability of the annular recess bottom 8 which thus acts as a kind of diaphragm. Overstressing of the bottom 8, when a particularly heavy loading is applied, for example due to the wearer of the shoe stepping on a small stone, is avoided by the abutment body 14 on the top side of the bottom 8 of the respective recess 2 coming to bear against the layer of the sole which is disposed thereabove.

When the foot is lifted off the ground in the course of the rolling movement involved in walking or running, the above-indicated loading on the projections 3, which have been pressed into the recesses 2, ceases again. Therefore the elastic return force of the bottom 8 of each recess 2 causes the projection 3 to return to the initial position shown in Figure 2. When that happens, the bottom 8 of the recess, insofar as it has experienced deformation, and in particular the projection 3 with its peripheral surface 3' and possibly also with its end face 10, displace sand or dirt which has penetrated into the

recess, out of the recess again. That affords the desired self-cleaning effect for the outsole 1.

Reference will now be made to Figure 3 showing a modified embodiment which differs from that described with reference to Figures 1 and 2 only by virtue of the end face 10' of the projection 3 being curved in a lens-like configuration. In this arrangement also the projection 3 does not project beyond the ground-engaging side of the outsole 1, but is at least substantially in one plane therewith, at the apex of its end face 10'. As the depth of the recesses 2 is relatively small (for example only about 1 1mm) in both embodiments, the projection 3 in the embodiment of Figures 1 and 2 is substantially in the form of a small plate portion with a sharp edge, while in the embodiment shown in Figure 3 it is in the shape of half a lens configuration.

It is possible to depart from the embodiments described above, in regard to various details thereof, without departing from the scope of the invention. Thus for example the end faces 10 and 10' respectively do not need to extend in one plane with the ground-engaging surface of the outsole 1, but can be disposed in such a position as to be set further into the respective recess 2. More than one projection may also be arranged in a recess, when of suitable size. The recesses do not have to extend in a rounded configuration towards the bottom 8 thereof but may also be cylindrical so that an edge is formed with the annular bottom 8 of the recess. The projection itself may also have a cylindrical peripheral surface so that an edge is also formed between the peripheral surface and the annular bottom 8. Furthermore the recesses do not have to be arranged as close together as is shown in Figure 1. On the contrary, the spacings between the individual recesses and therewith also the number thereof can be selected having regard to the intended purpose of the sports shoe to be equipped with the outsole according to the invention.

It will be appreciated therefore that various other modifications and alterations may be made in the above-described embodiments of the invention without thereby departing from the spirit and scope thereof.

Claims

1. An outsole (1) of elastically deformable material for a sports shoe, in particular a tennis shoe, with a sole profiling in the form of a multiplicity of recesses (2) in the ground-engaging side of the outsole, characterised in that at least one projection (3) is connected to the bottom (8) of the respective recesses (2), the projection projecting towards the ground-engaging side, that the part of the bottom (8), which surrounds the projection, is elastically deformable in such a way that the bottom can be pressed into a free space (12) provided thereabove, and that in the non-deformed condition of the bottom (8) the projection (3) does not project beyond the ground-engaging side of the outsole (1).

2. An outsole as set forth in claim 1 characterised in that the part of the bottom (8), which surrounds the projection (3), is annular.

3. An outsole as set forth in claim 1 or claim 2 characterised in that the outsole is of a multi-layer structure and the free spaces are each formed by openings (12), at the foot side, in the sole layer (1) which has the profiling.

4. An outsole as set forth in claim 1 or claim 2 characterised in that the outsole is of a multi-layer structure and the free spaces are each formed by openings, at the ground-engaging side, in a sole layer which is connected to the sole layer which has the profiling.

5. An outsole as set forth in one of claims 1 to 4 characterised in that connected to the top side of the bottom (8) of the recesses (2) is an abutment body (14) which projects into the associated free space (12).

6. An outsole as set forth in one of claims 1 to 5 characterised in that the recesses (2) are cup-shaped and the projections (3) arranged therein are of circular cross-section.

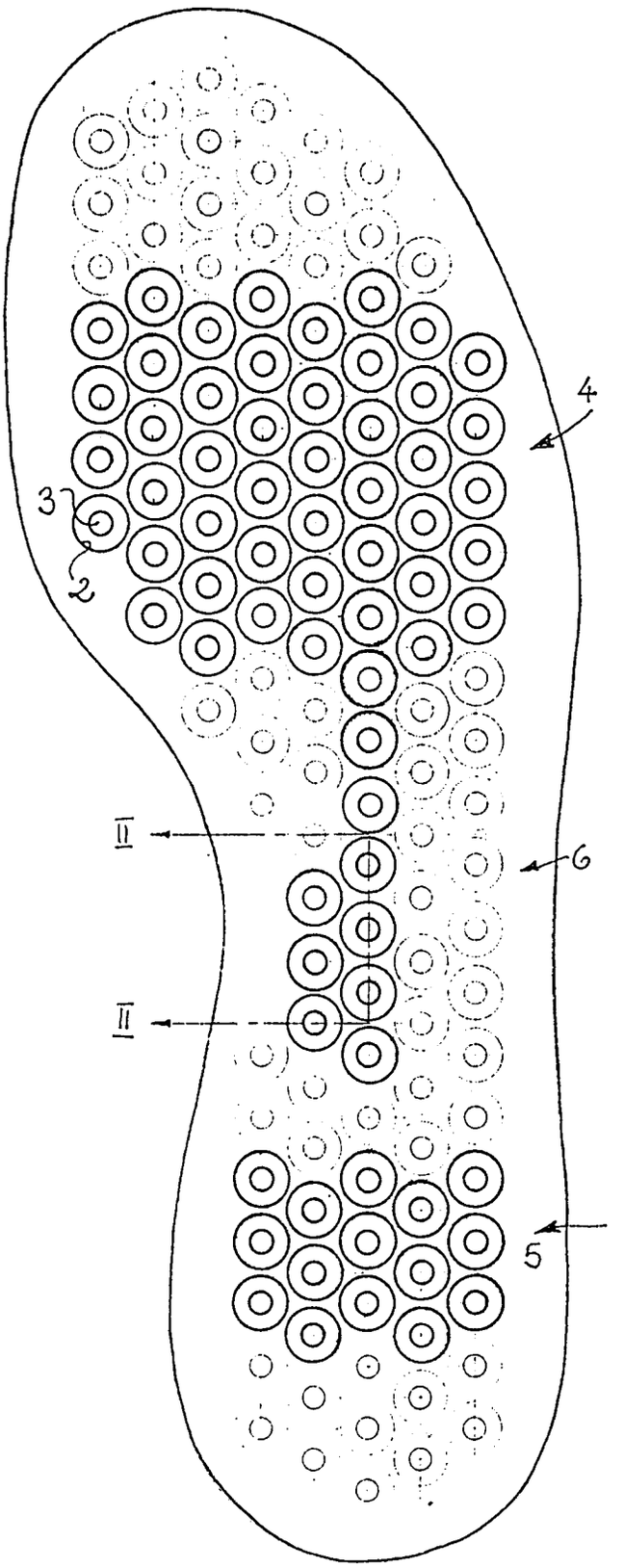
7. An outsole as set forth in one of claims 1 to 6 characterised in that the ends (10') of the projections (3) are convexly curved.

8. An outsole as set forth in claim 7 characterised in that the curvature of the end (10') extends to the bottom (8) of the recess.

9. An outsole as set forth in one of claims 1 to 8 characterised in that the wall of each recess (2) extends towards the bottom (8) thereof in a spherical or toroidal configuration.

10. An outsole as set forth in one of claims 1 to 9 characterised in that a group of recesses (2) is provided at least on the foresole portion in the ball region (4).

Fig.1



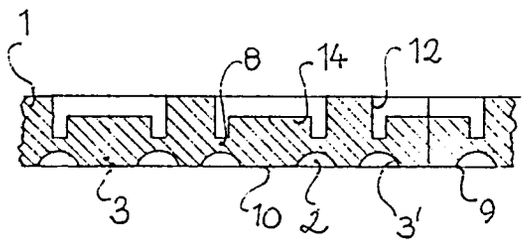


Fig.2

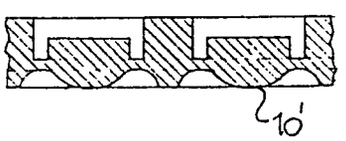


Fig.3

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 4841

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-205 161 (HILLIAR) * page 3, line 10 - line 29; figures 4-8 * * page 2, line 65 - line 92 *	1,2,5,6, 9	A43B13/22
X	FR-A-2 308 324 (FAMOLARE INC) * page 5, line 10 - page 6, line 6; figures 4,5 *	1	
A	US-A-1 653 059 (NELSON) * page 1, line 62 - line 97; figures *	1	
D,A	DE-U-93 02 067 (ADIDAS A.G.) * page 6, line 10 - line 28; figures *	1	
A	GB-A-1 076 729 (CAT'S PAW RUBBER COMPANY) * page 2, line 123 - page 3, line 6; figures *	7,9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) A43B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 November 1995	Scholvinck, T

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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