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(54) **Sole**

(57) The present invention relates to a sole for a shoe, in particular a running shoe with at least one first ground engaging profile element having a first flexibility and at least one second ground engaging profile element having a second flexibility, where the second profile element has a ridge- or riblike shape and the second flexibility is greater than the first flexibility.

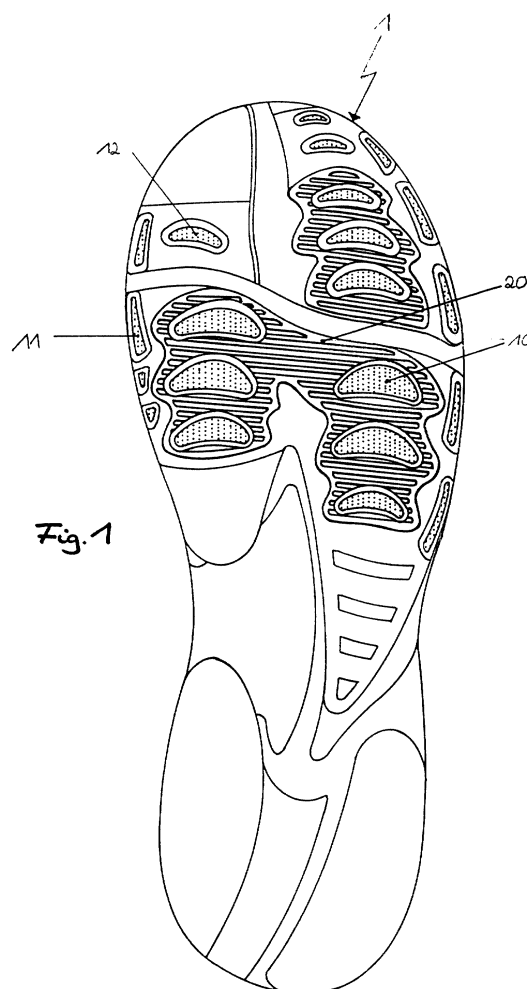


Fig. 1

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Description

1. Technical field

[0001] The present invention relates to a sole for a shoe in particular a running shoe.

2. The prior art

[0002] When shoes, in particular running shoes, are constructed, the design of the sole is of particular importance. This part of the shoe combines several functions. On the one hand the sole should, depending on the intended use of the shoe, provide a sufficient cushioning to reduce as much as possible the arising stress on the human body. The design of the lower part of the sole (the outsole) determines on the other hand the interaction of the shoe with the ground. One objective is to optimize the grip of the shoe on the ground.

[0003] In this context it has been known for years that the optimal design of the sole of a running shoe, i.e. the number, distribution, shape and flexibility of the profile elements arranged thereon strongly depends on the intended use of the corresponding shoe. The term running shoe comprises all kinds of shoes where the sole directly contacts the ground, as for example jogging shoes or sprint shoes but also shoes for everyday use and hiking boots. It is for example obvious that a sole for a hiking boot to be used on rough ground comprises preferably a coarser profile structure than a sports shoe for indoor sports.

[0004] However, it is often the problem with sports shoes that the exact field of use of the shoe, i.e. the ground on which the shoe is to be used, is not unambiguously determined in advance. Running shoes for trail running for example are often used on a plurality of different surfaces.

In this trail running sport, the athlete runs over long distances not only on even asphalt roads but also on gravel roads or woodland trails. Depending on the weather conditions, the ground might further be either dry and hard or wet and muddy. This leads to the desire of the manufacturer of such shoes to construct soles providing on a plurality of grounds a sufficient grip to allow the multipurpose use necessary for a trail running shoe.

[0005] In the prior art it is known to use soles with different components:

[0006] The US 5,634,283, for example, discloses a golf shoe where metal tips for the improvement of the grip on soft ground, for example grass, are flexibly anchored in a sole. During walking on hard ground the pressure on the shoe caused by the weight of the wearer of the shoe pushes the metal tips into the sole so that on hard ground the grip is only provided by the other parts of the sole.

[0007] A similar effect is shown in the US 4,271,608 for a golf shoe, where the metal tips are closely encompassed by flexible sole material. However, in this case

the objective is not a use on different grounds but a "self-cleaning effect": During running the elastic sole material is compressed around the respective metal tip so that the metal tip can penetrate the ground. After subsequent lifting of the shoe the elastic sole material expands again and cleans thereby the metal tip from adhering dirt.

[0008] Further, the US 4,398,357 discloses a shoe with a sole consisting of two materials with different densities. Whereas a more dense and therefore more wear resisting material is used in the heel and ball parts, the intermediate part of the sole arranged below the arch of the foot is manufactured from a less dense and therefore more lightweight material in order to reduce the overall weight of the sole.

[0009] The US 5,926,974, finally, discloses a sole designed according to the hoof of a mountain goat. To this end several soft protruding profile elements are provided, surrounded by a sequence of comparatively hard lugs attached to the outer perimeter of the sole. The hard lugs limit the compression of the soft profile elements and improve the grip on an irregular ground.

[0010] From the discussion of the prior art follows that up to now different sole materials were almost exclusively employed with respect to the use on grounds with a different hardness, the self-cleaning of the profile and to reduce the overall weight of the shoe. The problem of a use on grounds with a different roughness (asphalt surfaces or gravel) has until now not been addressed.

[0011] It is therefore the problem of the present invention to provide a sole for a shoe, in particular a running shoe, assuring a reliable grip on grounds of different roughness.

3. Summary of the invention

[0012] The present invention relates to a sole for a shoe, in particular a running shoe with at least one first ground engaging profile element having a first flexibility and at least one second ground engaging profile element having a second flexibility, where the second profile element has a ridge- or riblike shape and the second flexibility is greater than the first flexibility.

[0013] Due to the greater flexibility compared to the first profile element and the ridge or riblike shape of the at least one second profile element, the effect according to the invention for the adaptation to the roughness of the ground is achieved: On a comparatively even surface, for example asphalt or the surface of a gymnasium, the first and second profile elements together provide the great contact area of the sole necessary for a good grip.

[0014] On a rough ground, however, for example a gravel road, the at least one more flexible ridge- or riblike profile element is deflected by protrusions of the ground so that with the at least one first profile element a comparatively rough sole is obtained. In this situation the second profile element is capable to penetrate the ground or to engage the protrusions of the ground

whereby the grip of the sole under these ground conditions is improved.

[0015] As a result this property of the second profile element, which can also be characterized as a lamella-like structure, assures together with the less flexible first profile element the necessary adaptability to the corrugation of the ground of the sole according to the invention.

[0016] The height of the first profile element preferably slightly exceeds the height of the second profile element. Thus, both profile elements simultaneously contact on even surfaces the ground, when the first profile element is compressed by the weight of the athlete.

[0017] Preferably, a plurality of second profile elements are arranged around the at least one first profile element. Thereby an isolated first profile element is obtained, when the second profile elements are deflected, as described above, which is well suited to engage a rough surface.

[0018] Preferably, the second profile elements consist of 1 to 2 mm wide parallel ridges having a distance of preferably 1 to 2 mm from each other. This assures that the ridges can deflect on a rough surface independently of each other to obtain the above described effect.

[0019] Preferably, a plurality of first profile elements are arranged in the forefoot and midfoot part of the sole, since these are the areas of the sole being decisive for the grip during push-off from the ground. Preferably, the first profile elements are essentially sickle shaped and perpendicularly oriented with respect to the longitudinal axis of the sole to support in particular a forwardly directed push-off. For improving the sideways grip, additional first profile elements can be arranged along the outer edge of the midfoot and forefoot part.

[0020] Further developments of the sole according to the invention are the subject matter of the dependent claims.

4. Short description of the drawing

[0021] In the following detailed description presently preferred embodiments of the present invention are described with reference to the drawing which shows:

Fig. 1: A planar view of a simplified representation of a preferred embodiment of a sole according to the invention for a left shoe;

Fig. 2: A complete perspective representation of the preferred embodiment of Fig. 1.

5. Detailed description of the invention

[0022] A preferred embodiment of the present invention comprises a sole 1 with essentially two groups of profile elements (cf. Fig. 1). For the sake of simplicity, only exemplary profile elements 10, 20 of the two groups are provided with reference marks in the Figs. 1 and 2.

However, it is to be understood that the following description relates to all profile elements of the respective group, where variations within one group concerning the size and the orientation are possible.

[0023] As can be seen from Fig. 1, presenting a view from underneath, all together nine first profile elements 10 are arranged preferably on the medial and lateral midfoot part and the lateral forefoot part of the sole 1 which are preferably embedded into a plurality of ridge- or riblike profile elements 20. This arrangement of the elements 10, 20 corresponds to the fact that these parts of the sole 1 are of decisive importance for a good grip, in particular during the rolling-off and pushing-off phase of the step cycle. For an additional support of the grip during the ground contact with the heel, additional profile elements 10, 20 can be arranged in the heel part of the sole 1 (not shown).

[0024] The profile elements 10 are in their original configuration preferably 0.5 mm higher than the second profile elements 20, so that under a compression by the weight of the athlete both groups of profile elements simultaneously contact the ground. As a result a comparatively dense profile results, as can be seen in the perspective representation of Fig. 2, providing a good grip on an even ground like an asphalt road or the surface of a gymnasium. In the preferred embodiment shown in Figs. 1 and 2 the height of the profile elements is approx. 5 mm. However, other vertical dimensions, preferably between 1 and 10 mm, are also possible.

[0025] The profile elements 10 preferably consist of a comparatively hard and therefore inflexible material. They deform only slightly under stress during the ground contact and are therefore capable to penetrate the ground, on which the sole according to the invention is used. The preferred hardness is in the range of 65 A.

[0026] In contrast thereto, the ridge- or riblike profile elements 20 are preferably made out of a soft and sticky rubber, providing a great flexibility and a good grip even on wet surfaces. Their preferred hardness is in the range of 60 A. Due to their greater flexibility, the profile elements 20 are forwardly or backwardly deflected (cf. arrow in Fig. 2). As a result, they retract compared to the first profile element 10 and do no longer extend as far downwards as the first profile elements 10. This happens in particular during running on grounds with a great roughness, as for example gravel roads. By the deflection of the second profile elements 20 the resulting overall profile of the sole according to the invention is dominated by the harder profile elements 10 so that a comparatively rough sole 1 is obtained.

[0027] Although this function of the ridge- or riblike second profile elements 20 is shown in Figs. 1 and 2 with parallel, preferably perpendicularly to the longitudinal axis of the sole oriented ribs, also other shapes and arrangements of the ridge- or riblike second profile elements 20 are possible. Conceivable are for example concentric rings around the first profile elements 10 or irregularly arranged longitudinal units with an arbitrary

orientation.

[0028] Preferably, the single ridges 20 have a width of 1 to 2 mm and a distance which is also between 1 and 2 mm. These values, however, are only rough values. In detail, the distance of the profile elements 20 with respect to each other is determined by the requirement that they do not interfere with each other when they deflect and lose thereby the required greater flexibility with respect to the first profile elements 10.

[0029] In the preferred embodiment shown in Figs. 1 and 2 the first profile elements 10 have an essentially sickle shaped design and are oriented, as the second profile 20, essentially perpendicularly to the longitudinal axis of the sole. Thereby they support in particular a forwardly directed push-off of the wearer of the shoe. Possible are also other shapes and orientations of the first profile elements 10, for example a Z-like shape.

[0030] In the following further additional details of the preferred embodiment of the sole according to the invention shown in Fig. 2 are described.

[0031] To support not only a forwardly directed push-off but also the sideways grip of the shoe preferably additional first profile elements 11 are arranged along the medial and lateral edge of the midfoot and forefoot part, where their orientation follows essentially the course of the edge of the sole 1. Further, additional other separate profile elements 12 are arranged perpendicularly to the longitudinal axis of the sole in the forefoot part to provide also in the last phase of the step cycle a good grip.

[0032] Additionally, the medial and center part of the forefoot is preferably provided as a stable rolling-off surface 31 extending upwardly from the sole over the front part of the upper of the shoe (not shown) to increase the lifetime of the shoe. In the preferred embodiment shown in Fig. 2 this rolling-off surface 31 is ribbed, other profile shapes are also conceivable.

[0033] Between the forefoot part and the midfoot part extends preferably from the medial to the lateral side a continuous groove-like indentation 40. By this indentation 40 the bending stiffness of the sole is selectively reduced in order to impair the natural rolling-off movement of the foot with the toes as little as possible.

[0034] Preferably, additional ribs 50 are provided in the rear part of the midfoot part close to the arrangement of the first and second profile element 10, 20. The additional ribs 50 have preferably a mirror-inverted orientation and shape with respect to the first profile elements 10. Thus a forward sliding is effectively avoided during the landing phase when the foot contacts the ground. Whereas the preferred profile elements 10, 20 primarily support the forwardly directed push-off, the additional ribs 50 serve to decelerate the shoe during the landing on the ground. Preferably, the additional ribs have metal surfaces to improve the grip on soft ground.

[0035] To provide an increased stability for the described sole with its plurality of profile elements, a reinforcing element 60 is arranged between the midfoot part and the heel part which simultaneously supports the

arch of the foot. Whereas the parts of the sole described until now are made out of more or less flexible materials and serve for improving the grip of the shoe, the reinforcing element 60 is preferably a rigid structure element of the sole 1, preferably made out of a stable plastic material. Preferably, the reinforcing element 60 encompasses the sole 1 on its medial side and has therefore a three-dimensional shape. In the embodiment shown in Fig. 2 the reinforcing element extends into the heel and midfoot part; the degree of the extension, however, may vary. Conceivable is also that the reinforcing element 60 extends over the complete width of the sole 1 up to the lateral side.

[0036] The heel part of the sole comprises preferably on its lateral side a damping element 70, since the major part of athletes contacts at first with this part of the sole the ground whereby the greatest stress arises. However, it is also possible that the damping element 70 extends over the complete heel part. The surface of the damping element may, as already mentioned, comprise, additionally to the midfoot and forefoot part, the combination of first and second profile elements 10, 20 according to the invention; the embodiment of Fig. 2 shows for the sake of simplicity a simple grooved profile. In the preferred embodiment additional ribs 80 are arranged on the medial side of the heel part which avoid by their preferred inclined orientation a sideways sliding of the shoe immediately after the first ground contact.

Claims

1. Sole for a shoe, in particular a running shoe, comprising:
 - a. at least one first ground engaging profile element (10) with a first flexibility;
 - b. at least one second ground engaging profile element (20) with a second flexibility, wherein
 - c. the second profile element (20) has a ridge- or riblike shape and the second flexibility is greater than the first flexibility.
2. Sole according to claim 1 where the first (10) and the second profile element (20) have essentially the same height.
3. Sole according to claim 1 or 2 where a plurality of second profile elements (20) are arranged around the at least one first profile element (10).
4. Sole according to claim 3 where the second profile elements (20) consist of 1 to 2 mm wide parallel ridges (20) having a sufficient distance from each other to allow an essentially independent deflecting of single ridges (20).

5. Sole according to claim 4 where the ridges (20) have a distance of 1 to 2 mm with respect to each other.
 6. Sole according to any of the preceding claims where the second profile elements (20) are essentially perpendicularly oriented with respect to the longitudinal axis of the sole. 5
 7. Sole according to any of the preceding claims where a plurality of first profile elements (10) are arranged in the forefoot and mid-foot part of the sole. 10
 8. Sole according to claim 7 where the first profile elements (10) are essentially sickle shaped. 15
 9. Sole according to any of the preceding claims where the first profile elements (10) are essentially perpendicularly oriented with respect to the longitudinal axis of the sole. 20
 10. Sole according to claim 9 where additional first profile elements (11) are arranged along the outer edge of the midfoot and forefoot part. 25
 11. Sole according to any of the preceding claims where the first (10) and the second (20) profile element(s) have a height between 1 and 10 mm. 30
 12. Sole according to claim 11 where the first (10) and the second (20) profile element(s) have a height of 5 mm.
 13. Sole according to any of the preceding claims where an elongate indentation (40) is provided between the forefoot part and the mid-foot part extending from the lateral side to the medial side to facilitate by a greater flexibility the natural gait cycle. 35
40
 14. Sole according to any of the preceding claims where a reinforcing element (60) is arranged in the mid-foot part for the support of the arch of the foot.
 15. Sole according to any of the preceding claims where an additional damping element (70) is provided in the heel part of the medial and/or the lateral side. 45
 16. Sole for a shoe, in particular a running shoe, comprising: 50
 - d. at least two first ground engaging profile elements (10) with a first flexibility ; 55
 - e. a plurality of second ground engaging profile elements (20) with a second flexibility, wherein
- f. the at least two first profile elements (10) are in such a way arranged on the sole that they are encompassed by the plurality of second profile elements (20), and
- g. the second flexibility is greater than the first flexibility.
17. Shoe, in particular running shoe, with a sole according to any of the claims 1 to 16.

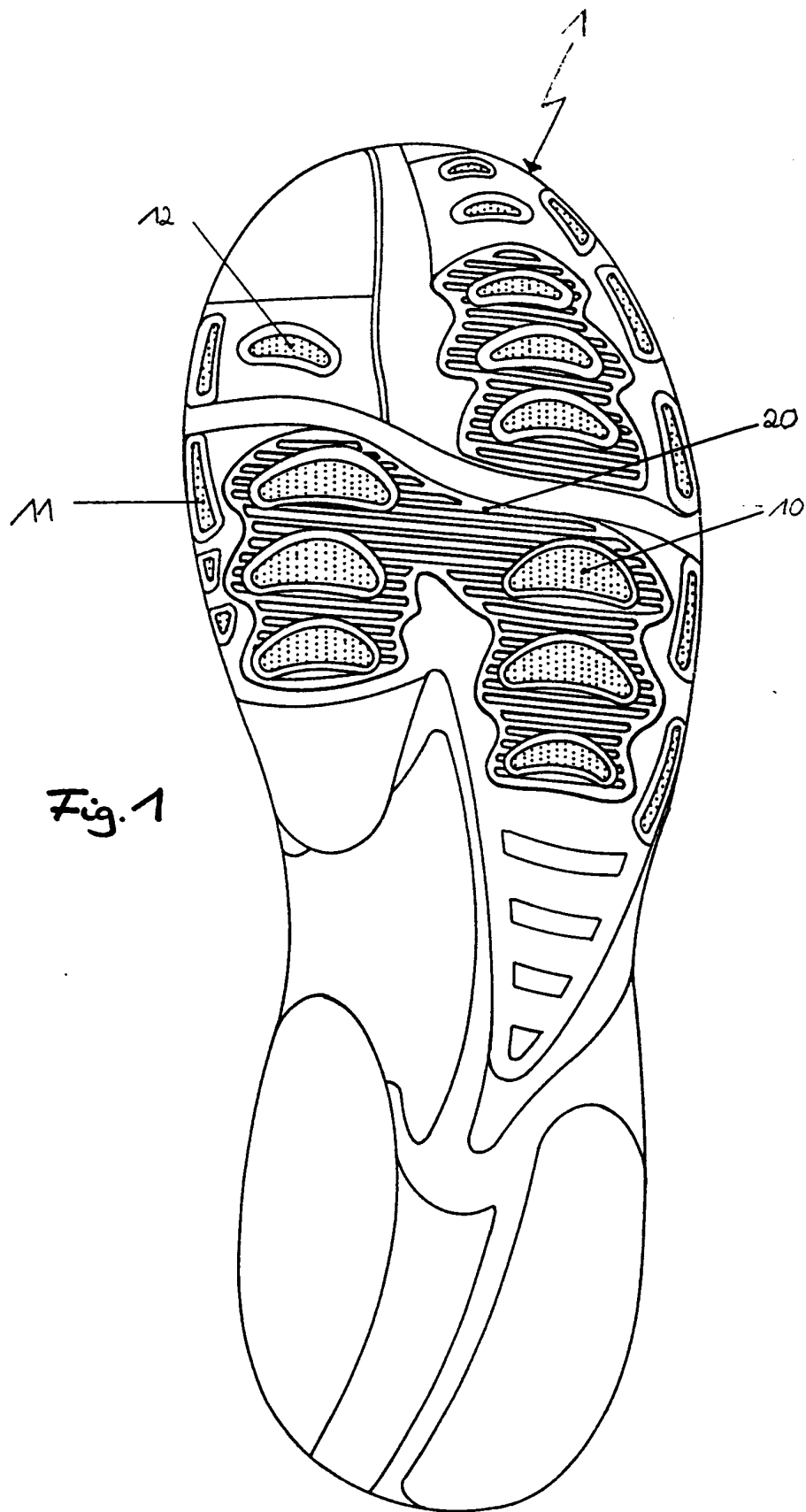
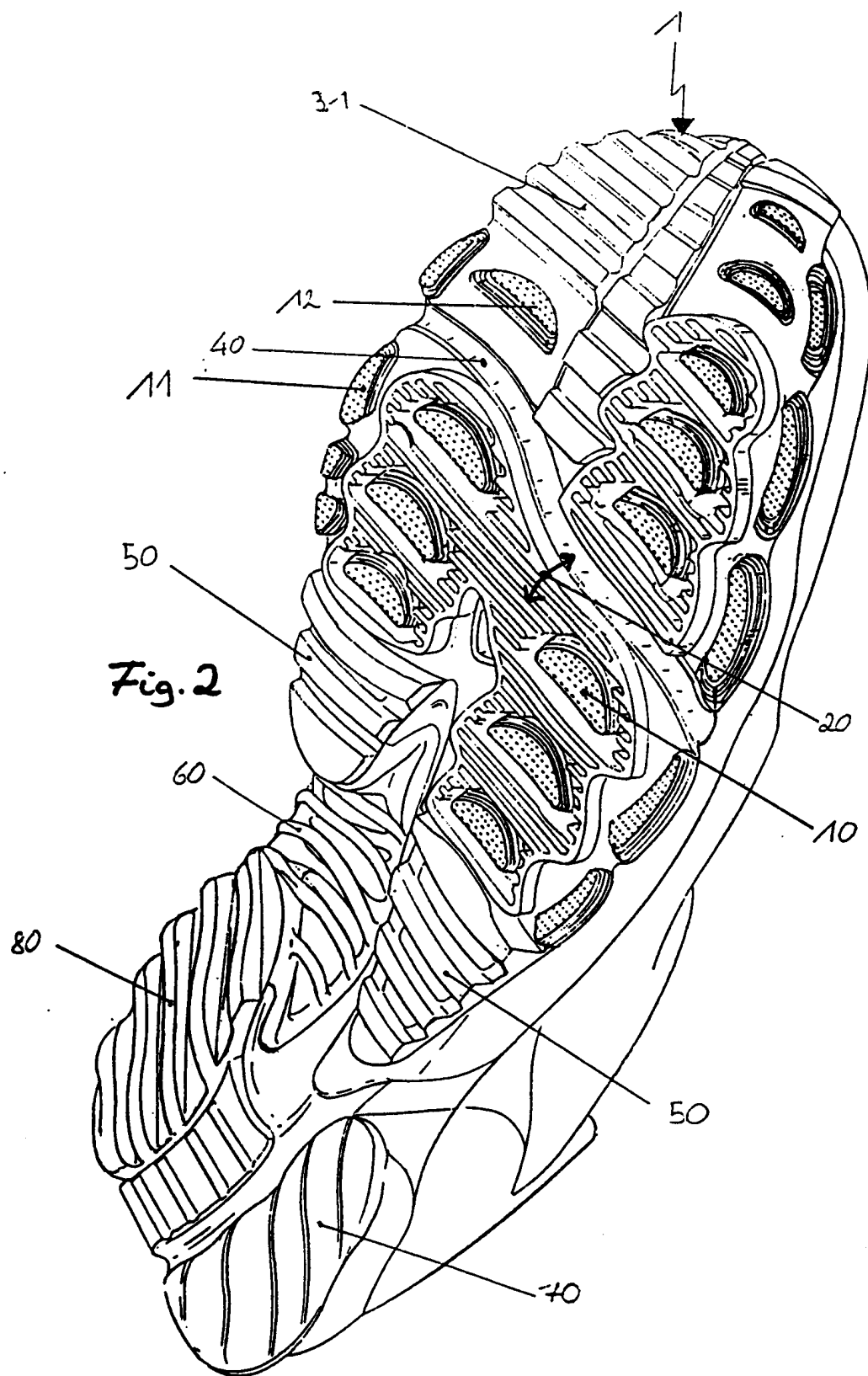


Fig. 1





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EUROPEAN SEARCH REPORT

Application Number
EP 00 12 3492

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The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
THE HAGUE		16 March 2001	DECLERCK, J
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