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(54) **Shoe with plantar arch support**

(57) A shoe comprising a sole (2) made of rubber-like elastic material in which, at the heel and at the front region of the sole, there are a rear chamber (5) and a front chamber (4) which contain a fluid and are connected one another by a passage (6) which lies on the inner side of the shoe and at the plantar arch; the pas-

sage (6) is shaped so as to curve upward and form a vault for supporting the plantar arch when, during walking, the fluid flows from the rear chamber (5) toward the front chamber (4).

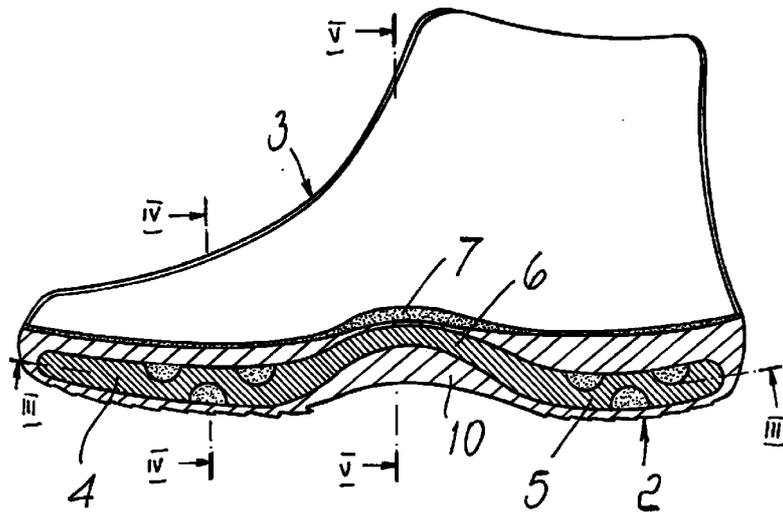


Fig. 2

Description

[0001] The present invention relates to a shoe with plantar arch support.

[0002] Shoes are already known in which at the plantar arch there is a shaped raised portion designed to support the plantar arch during walking. The effectiveness of the raised portion is only partial, owing to the fact that it actually only acts as a cushioning element but does not support the plantar arch.

[0003] The aim of the present invention is therefore to provide a shoe in which the sole is conceived so as to provide a contrasting thrust on the plantar arch when the arch is subjected to forces during walking.

[0004] Within the scope of this aim, an object of the present invention is to provide a shoe whose structure can be manufactured without having to resort to special equipment, using instead conventional methods, so as to provide a product which offers improved performance but remains cheap.

[0005] This and other objects which will become better apparent hereinafter are achieved by a shoe characterized in that it comprises a sole made of rubber-like elastic material in which, at the heel and at the front region of the sole, a rear chamber and a front chamber are provided which contain a fluid, said chambers being connected one another by a passage which lies on the inner side of the shoe and at the plantar arch, said passage being shaped so as to curve upward and form a vault for supporting said plantar arch when, during walking, the fluid flows from said rear chamber toward said front chamber.

[0006] Further characteristics and advantages of the present invention will become better apparent from the following detailed description of a preferred embodiment thereof, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a side view of the shoe;

Figure 2 is a longitudinal sectional view of the shoe of Figure 1;

Figure 3 is a sectional view, taken along the line III-III of Figure 2;

Figure 4 is a sectional view, taken along the line IV-IV of Figure 2; and finally

Figure 5 is a sectional view, taken along the line V-V of Figure 2.

[0007] With reference to the above figures, the reference numeral 1 generally designates a shoe which comprises a sole 2 made of rubber-like elastic material which is associated, during molding, with an upper 3.

[0008] Two chambers 4 and 5 are formed in the sole 2, respectively occupy the front part of the sole and the rear part of the heel, and contain a fluid, specifically air or a similar gaseous mix.

[0009] The chambers 4 and 5 are mutually connected by a passage 6 which runs along the inner side

of the shoe, at the region where the supporting raised portion or plantar insert 7 is normally located.

[0010] The passage 6 has an upward arc-like shape which forms a vault and is laterally supported by a full-thickness region 8 of the sole toward the outside and by a thinner wall 9 toward the inside. The passage 6 is furthermore supported in a downward region by an arc-like portion 10 of the sole which tapers toward the front under the front chamber 4 and toward the rear under the chamber 5. In practice, the cross-section of the passage 6 is shaped like a flattened tube and the top of the vault that it forms is in tangent contact with the lower face of the plantar insert 7.

[0011] From the above description it is evident that during walking the contact of the heel on the ground produces the compression of the chamber 5 and accordingly causes the transfer of the fluid contained therein toward the chamber 4 through the passage 6. This inflates the passage 6, which consequently expands upward and is facilitated in doing so by the fact that the thickness of the sole above the passage is significantly smaller than the thickness below it. The passage 6 accordingly forms a vault which supports, like a bridge, the plantar insert 7, providing support for the plantar arch of the foot.

[0012] Once the load has shifted toward the front part of the shoe and therefore onto the chamber 4 as the shoe rolls over the ground, the pressure applied causes the fluid to return into the chamber 5. However, plantar arch support persists until the load on the sole has reduced substantially.

[0013] It is evident that the invention perfectly achieves the intended aim and object. In particular, it should be noted that the supporting action occurs at the time of most intense stress for the plantar arch, so as to avoid excessive stresses and fatigue of the muscles of the foot. This supporting action is proportional to the weight that bears onto the sole.

[0014] Numerous modifications and variations are possible in the practical execution of the invention, and all are within the scope of the same inventive concept.

[0015] According to a second embodiment of the invention, fluid-containing tubular rubber inserts 11 are arranged inside the chambers 4 and 5 and are designed to regulate the stability of the sole, since they hinder the transfer of the fluid inside the chambers 4 and 5.

[0016] In the practical execution of the invention, the sole 2 is manufactured using conventional systems for the injection-molding of suitable plastic materials, for example by applying to the bottom of the shoe a bladder which forms the chambers 4 and 5 and the passage 6 and by performing an injection-molding process to cover it with a layer of rubber-like elastic material or the like.

[0017] A liquid or a gas can be used as transfer fluid, depending on the expected compression stresses.

[0018] The disclosures in Italian Utility Model Application No. BO99U000113 from which this application claims priority are incorporated herein by reference.

[0019] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the scope of each element identified by way of example by such reference signs.

Claims

1. A shoe, characterized in that it comprises a sole (2) made of rubber-like elastic material in which, at the heel and at the front region of the sole, a rear chamber (5) and a front chamber (4) are defined which contain a fluid, said chambers being connected one another by a passage (6) which lies on the inner side of the shoe and at the plantar arch, said passage (6) being shaped so as to curve upward and form a vault for supporting said plantar arch when, during walking, the fluid flows from said rear chamber (5) toward said front chamber (4).
2. The shoe according to claim 1, characterized in that said passage (6) has an upward arc-like shape so as to form a vault and is laterally supported by a full-thickness region (8) of the sole toward the outside of the shoe, by a reduced-thickness wall (9) toward the inside, and by an arc-like portion (10) of the sole in a downward region, said sole portion tapering toward the front under the front chamber (4) and toward the rear under the rear chamber (5), said passage (6) having a flattened tubular cross-section in which the top of the vault that it forms is in tangent contact with the lower face of the plantar insert (7).
3. The shoe according to claim 2, characterized in that said chambers (4, 5) accommodate tubular elements (11) which contain said fluid.
4. The shoe according to one of the preceding claims, characterized in that said chambers (4, 5) and said passage (6) form a bladder which is associated with the bottom of the shoe by injection-molding a covering layer made of rubber-like elastic material or the like.

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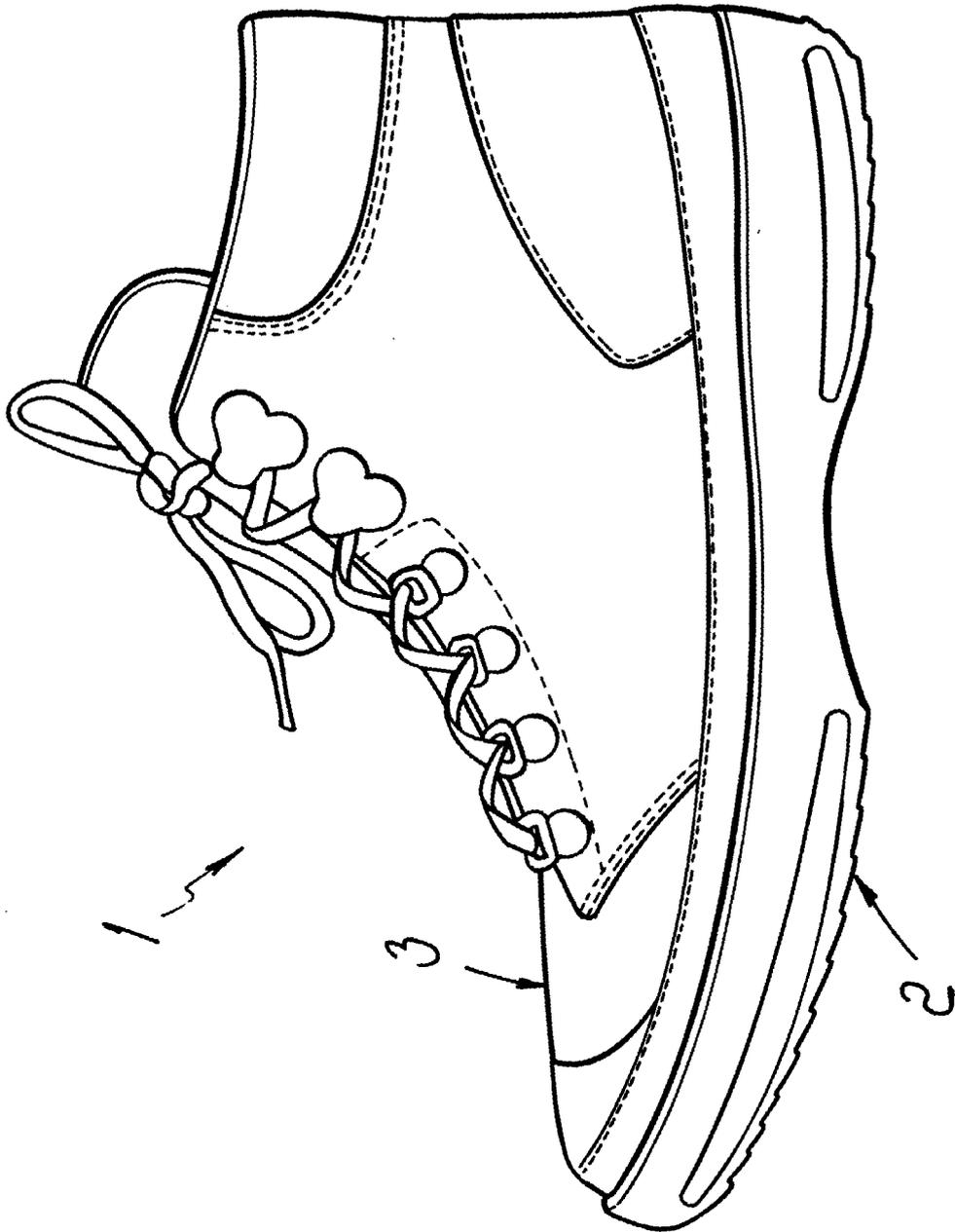


Fig. 1

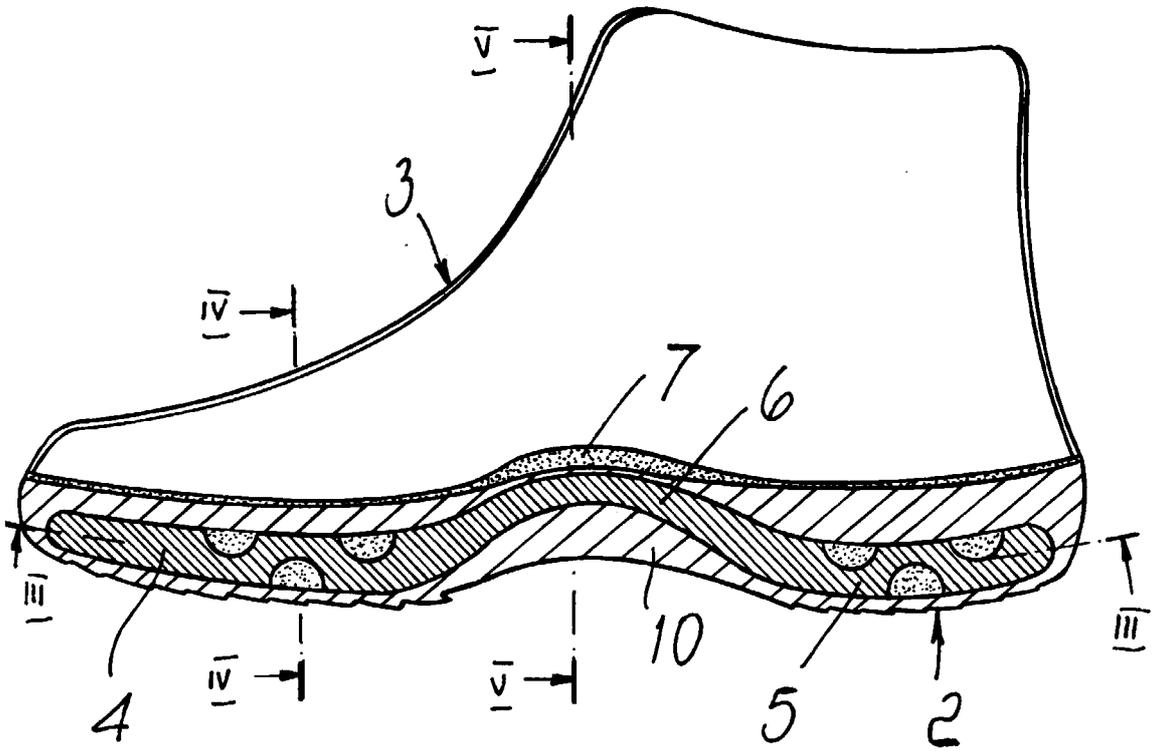


FIG. 2

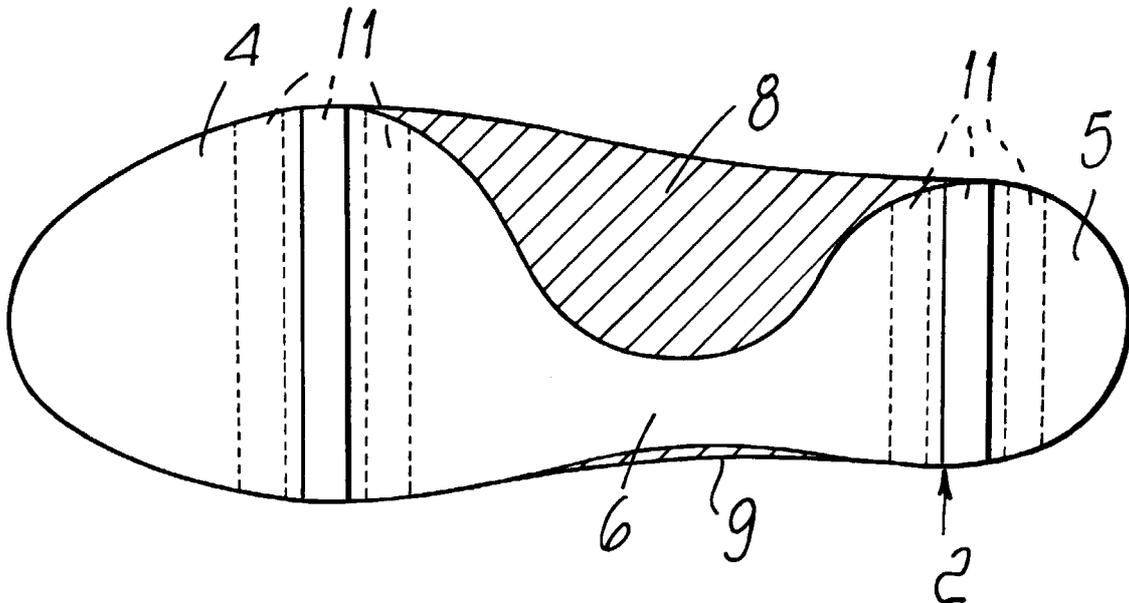


FIG. 3

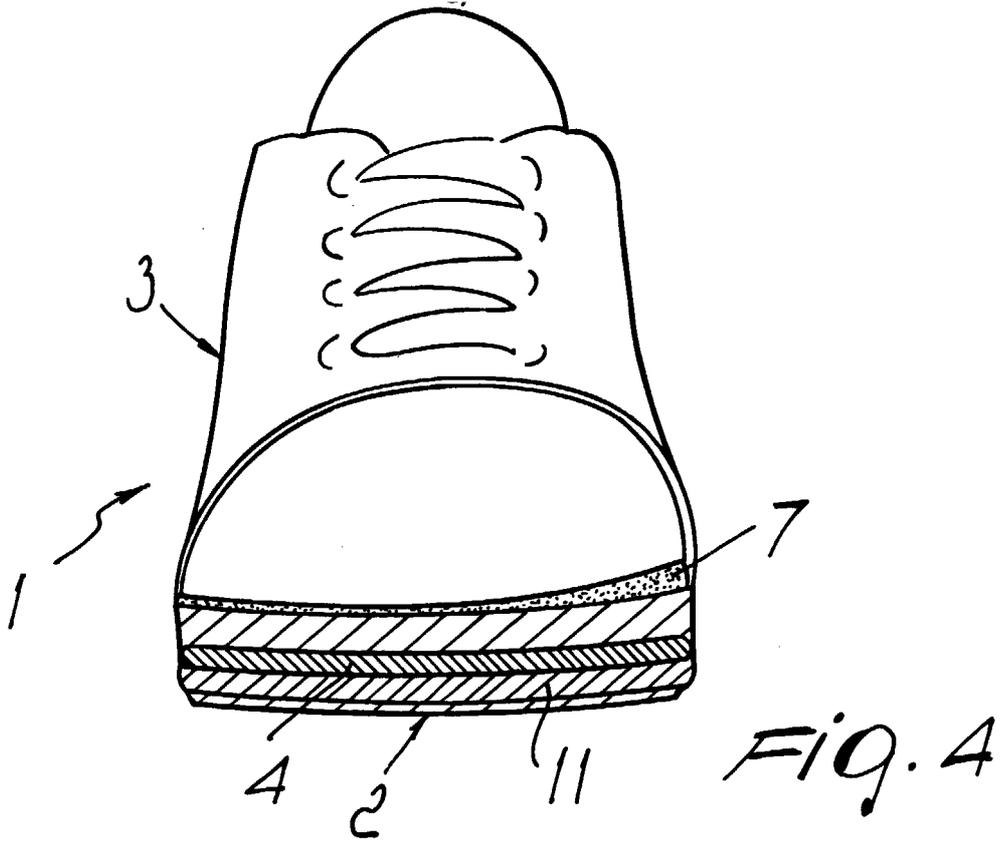


FIG. 4

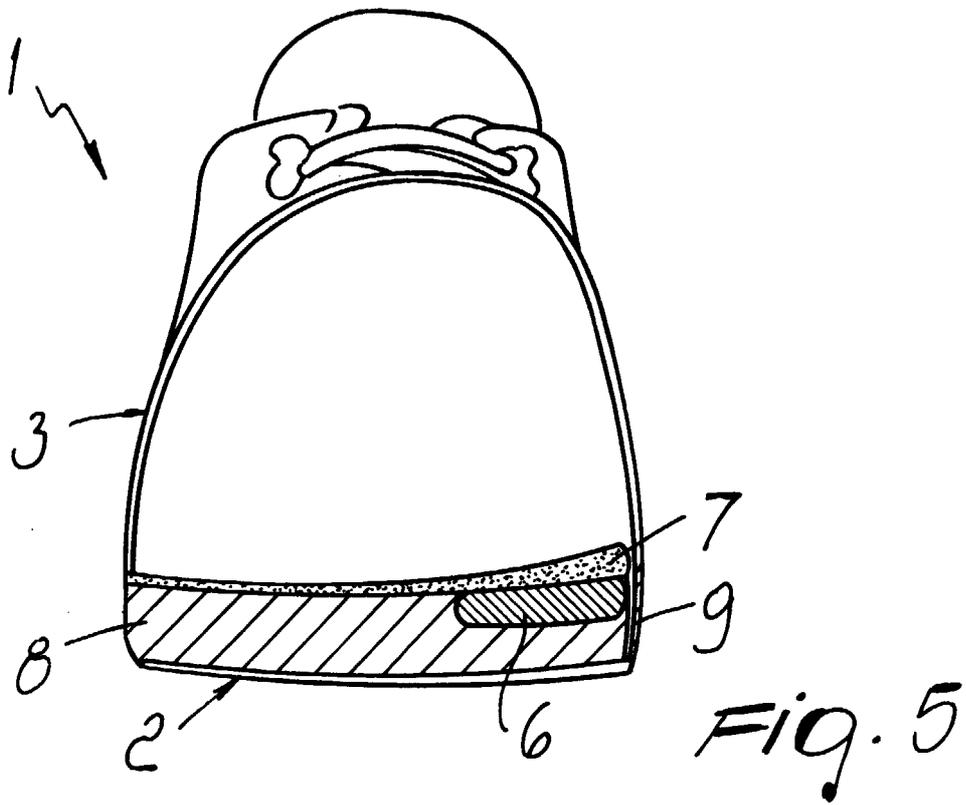


FIG. 5



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EUROPEAN SEARCH REPORT

Application Number
EP 00 12 1346

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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		12 January 2001	Claudel, B
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 00 12 1346

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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