



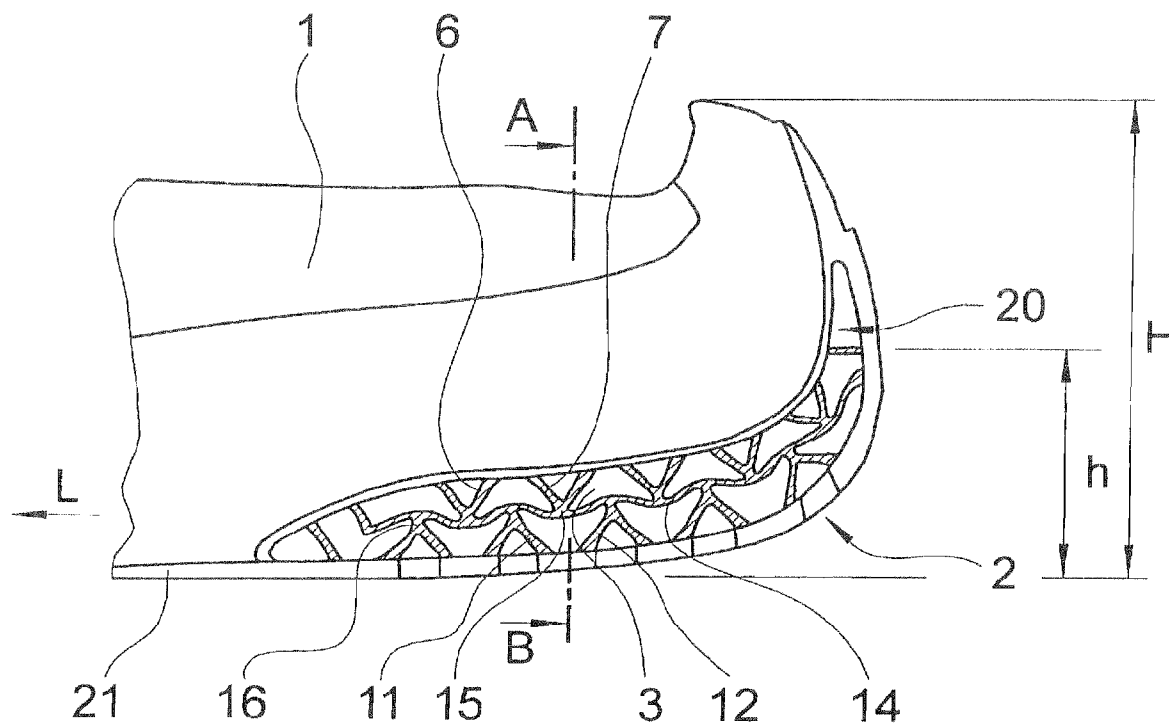
US 20090211114A1

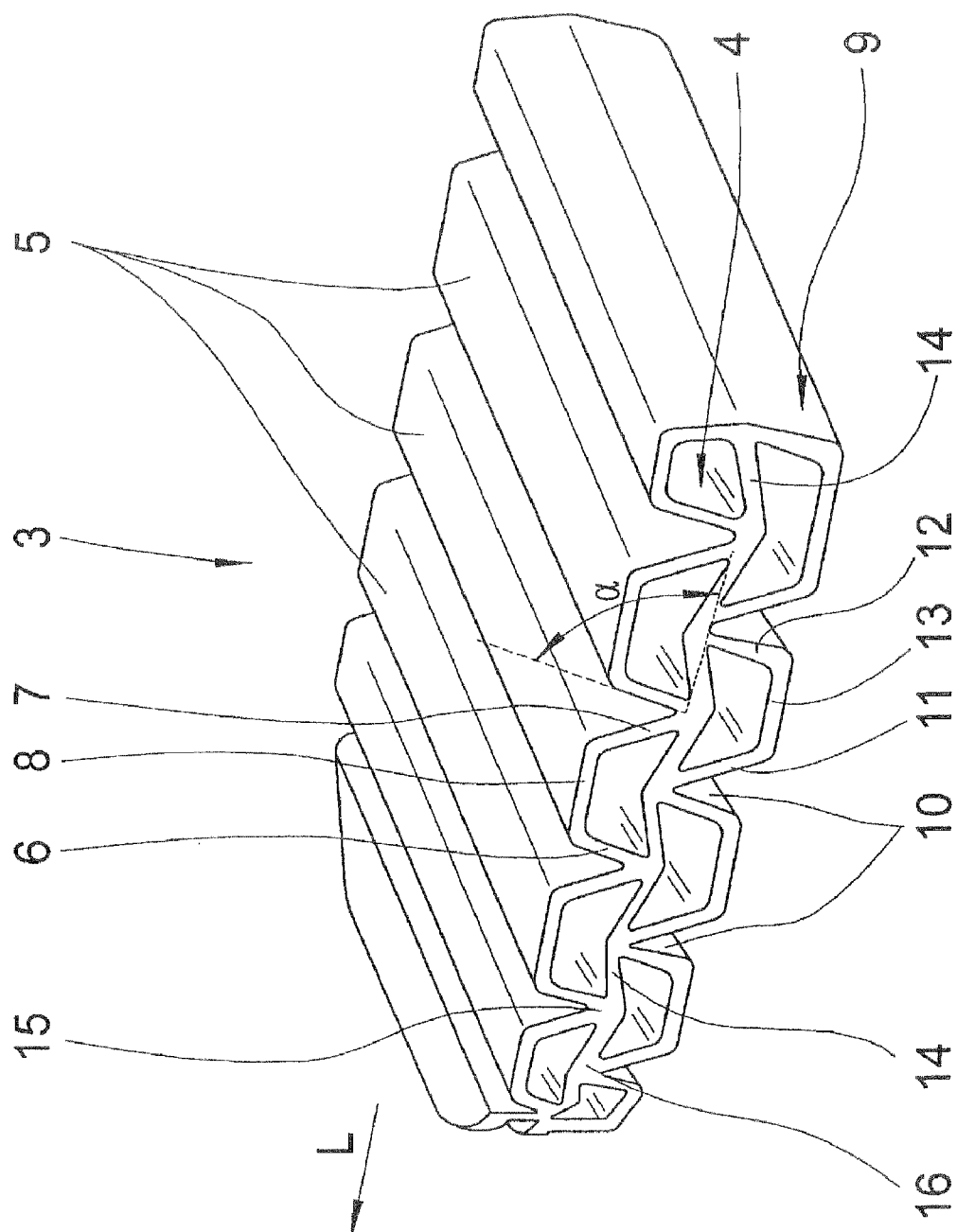
(19) **United States**(12) **Patent Application Publication****Ivester et al.**(10) **Pub. No.: US 2009/0211114 A1**(43) **Pub. Date: Aug. 27, 2009**(54) **SHOE, IN PARTICULAR SPORTS SHOE**(30) **Foreign Application Priority Data**(75) Inventors: **Richard G. Ivester**, Arlington, MA
(US); **Richard P. Hadfield**, London
(GB)

Nov. 2, 2005 (DE) 10 2005 017 043.7

Publication Classification(51) **Int. Cl.****A43B 13/00** (2006.01)**A43B 5/00** (2006.01)**A43B 13/28** (2006.01)(52) **U.S. Cl.** **36/103; 36/114; 36/27; 36/28**(57) **ABSTRACT**

The invention relates to a sports shoe, with a damping element (3). To improve the spring constant of the damping element, the damping element (3) has an, upper group (4) of damping bodies (5) and a lower group (9) of damping bodies (10), each having a substantial U-shaped cross section. The upper damping bodies (5) have two legs (6, 7) which are connected with a connection section (8). The lower damping bodies (10) have two legs (11, 12) which are connected with a connection section (13). An intermediate carrier (14) is arranged between damping bodies (5; 10) and legs (6, 7; 11, 12). Adjacent legs (6, 7; 11, 12) of the respective damping bodies (5; 10) are connected at a location of conjunction (15, 16) and the locations of conjunction (15, 16) of the upper and of the lower damping bodies (5; 10) are offset in longitudinal direction (L).

Correspondence Address:
LUCAS & MERCANTI, LLP
475 PARK AVENUE SOUTH, 15TH FLOOR
NEW YORK, NY 10016 (US)(73) Assignee: **PUMA**
AKTIENGESELLSCHAFT
RUDOLF DASSLER SPORT,
Herzogenaurach (DE)(21) Appl. No.: **12/092,303**(22) PCT Filed: **Oct. 23, 2006**(86) PCT No.: **PCT/EP2006/010188**§ 371 (c)(1),
(2), (4) Date:**Aug. 28, 2008**



100

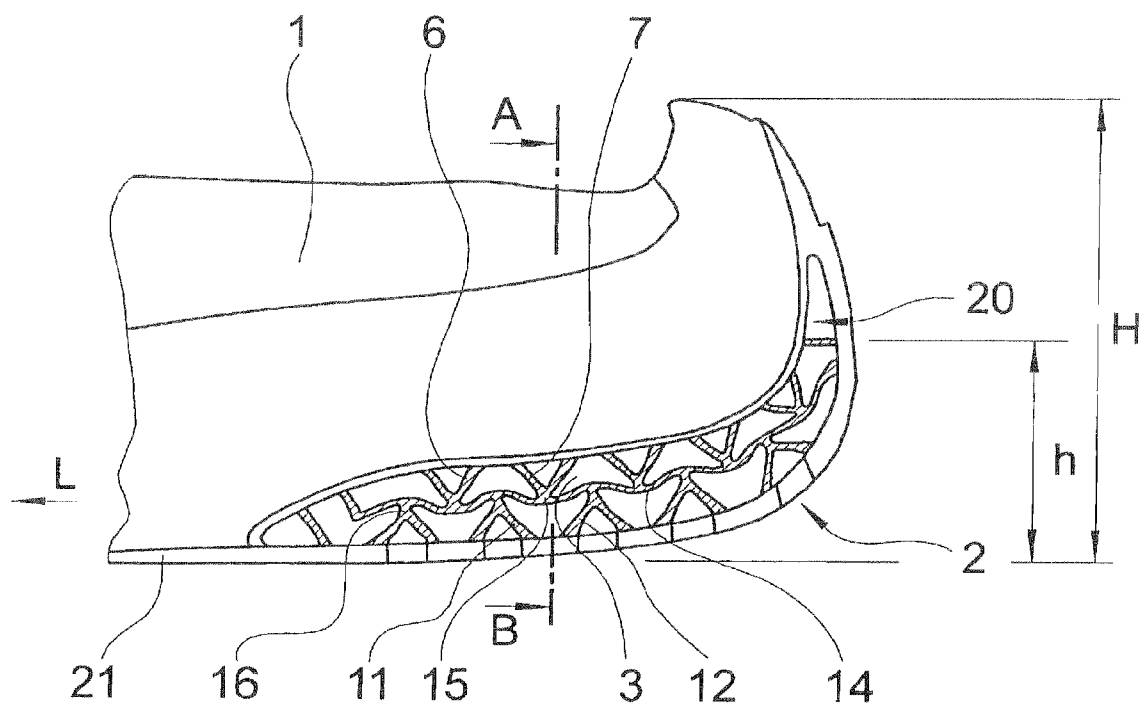


Fig. 2

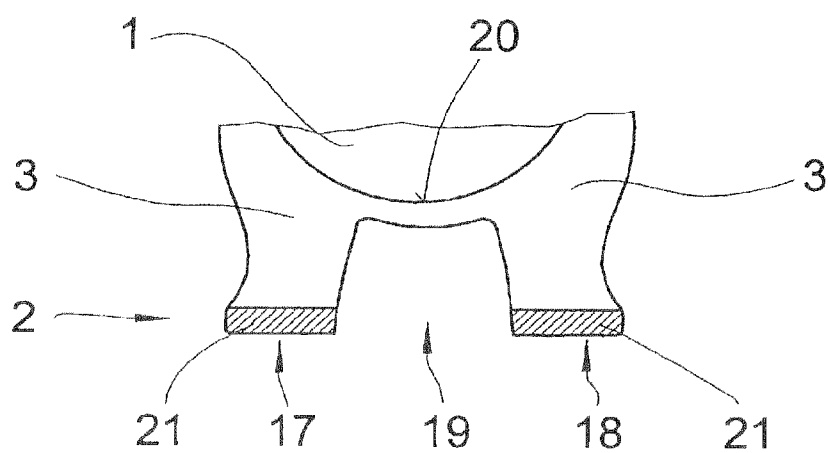


Fig. 3

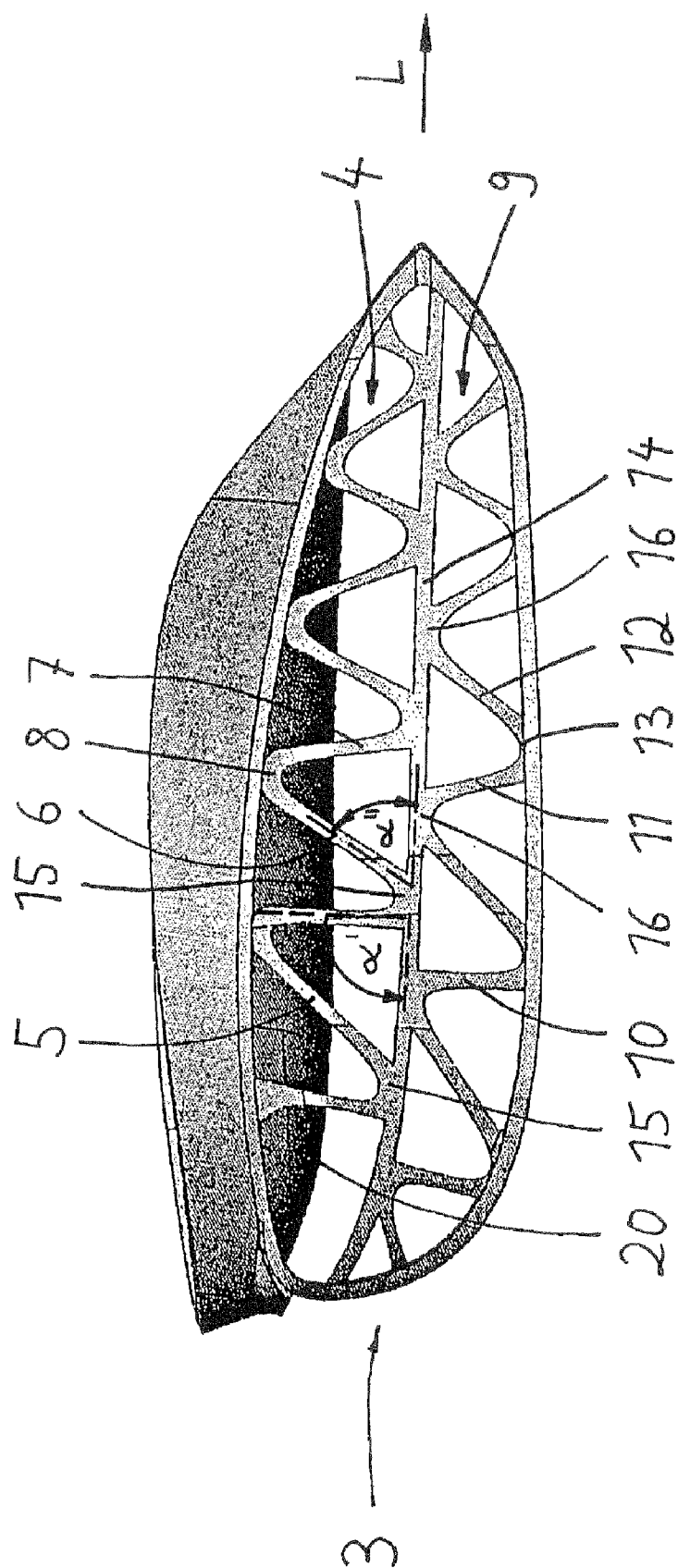


Fig. 4

SHOE, IN PARTICULAR SPORTS SHOE

[0001] The invention relates to a shoe, in particular a sports shoe, with a shoe upper part and a sole, wherein a damping element being arranged above or in the sole.

[0002] For sports shoes of this general kind it is necessary to care for a desired spring and damping behavior of the sole. For this, a plurality of solutions is known in the state of the art.

[0003] Wo 01/17384 A2 describes a sole for a shoe in the case of which a number of ribs which have a curved shape are positioned in the rear-foot region between a support part or inner part and an outsole. This achieves the effect that, when the sole is subjected to loading by foot impact forces, bending of the ribs takes place, the rib assuming an almost semi-ellipsoidal shape.

[0004] Here, it is detrimental that due to the deformation of the ribs a relative strong collapse of the spring stiffness is noticed along the load travel which leads to a bad control of the spring constant and is thus undesired.

[0005] The object of the invention is to further develop a shoe, especially a sports shoe, of the kind mentioned above so that a better controllable characteristic of the spring stiffness along the spring travel is obtained. Furthermore, the spring stiffness should run along the spring travel according to a desired function and should not suffer a collapse, especially of a progressive kind. By this it should become possible to influence the spring behavior of the shoe sole and of the damping element being arranged at or in the same respectively in a good manner.

[0006] The solution of this object according to the invention is characterized in that the damping element comprises: a first, upper group of damping bodies having a substantial U-shaped or bowl-shaped cross section, wherein the damping bodies have two legs respectively, which are connected with a connection section, a second, lower group of damping bodies having a substantial U-shaped or bowl-shaped cross section, wherein the damping bodies have two legs respectively, which are connected with a connection section, an intermediate carrier which is arranged between both groups of damping bodies and to which the legs abut with their end being remote from the connection section or with which the legs are connected, wherein adjacent legs of the respective damping bodies are abutting or are connected at a location of conjunction and wherein the locations of conjunction of the upper and of the lower damping bodies are offset in longitudinal direction of the damping element.

[0007] Preferably the locations of conjunction of one of the damping bodies are arranged in the middle between two locations of conjunction of the other damping bodies regarded in longitudinal direction of the damping element.

[0008] The idea of the invention thus suggests two different groups of damping bodies which are each bowl-shaped or U-shaped in cross section and which abut at locations of conjunction. The bowl-shaped or U-shaped bodies of the upper and of the lower group are directed with their open side to another and are connected via an intermediate carrier.

[0009] By this a damping element is developed which spring and damping properties are adjustable or influenceable along wide regions.

[0010] A further development suggests that the intermediate carrier is formed as a substantial flat, panel shaped part. By

this it should be still understood that the intermediate carrier has a—slightly—wavelike run in longitudinal direction of the damping element.

[0011] It is also possible that the intermediate carrier follows the run of the sole and bends gradually from the forefoot region via the middle foot region, where still a substantial flat form is given, to the heel region, i.e. it is there not flat. In the heel region the intermediate carrier can have especially the form of a shell.

[0012] In the case that the damping body has a bowl-shaped profile it is preferably arranged that the legs of the damping body extend linear and meet the intermediate carrier with an angle between 45° and 85° to the plane of the intermediate carrier or to the horizontal. By choosing the angle the spring behavior can be influenced significantly. The flatter the angle, by which the leg meets the intermediate carrier, the higher rises the compression force in the leg which arise during the loading of the shoe with a force.

[0013] The legs and the connection sections of the damping bodies can extend as a flat part at least along a part of the width of the shoe and form cavities. According to one embodiment it is suggested that the legs and the connection sections of the damping bodies extend as a flat part along the whole width of the sole. Alternatively, it is possible that the legs and the connection sections of the damping bodies extend as a flat part only along the side regions of the sole and leave an omitted region in the middle section.

[0014] The damping element extends according to one embodiment of the invention from the end at the heel side of the sole. It can be arranged at the bottom side of a heel shell. Furthermore, it can be that an outer sole is arranged at the bottom side of the damping element. An alternative solution to this suggests that the connection sections of the lower damping bodies are formed as a segmented outer sole.

[0015] To obtain also in the rear region of the shoe certain spring and damping properties the damping element can extend to the rear end of the shoe and can turn around the heel upwards. A further development suggests that the damping element extends until a height from 40% till 75% of the total height of the shoe in the heel region. As the end of the damping element the last leg of the bowl-shaped or U-shaped damping body is regarded.

[0016] The outer sole can extend at least along the whole region along which the damping element extends. Furthermore, it can also be arranged that the outer sole extends beyond the region of the damping element.

[0017] Benefits in terms of production technology can be obtained if both groups of damping bodies as well as the intermediate carrier are made as a one-part injection molding part.

[0018] The parts of the sole and, in particular, the damping element preferably consist of plastic, in particular of thermoplastic material. Especially preferred for this are polyethylene, polypropylene, polybutane, polyamide, polyurethane or a mixture of at least two of these plastics. The plastic may be translucent or transparent. The outer sole may also consist of plastic, preferably of polyethylene, polypropylene, polybutane, polyamide, polyurethane or a mixture of at least two of these plastics, or of rubber, wherein the material is not translucent or not transparent.

[0019] The material of the individual component parts of the damping element (legs, connection sections, intermediate carrier) and their geometrical dimensions may be selected by

a person skilled in the art to establish the cushioning and/or damping characteristics of the damping element.

[0020] With the proposed solution it is achieved that—at least along a certain spring travel—a spring stiffness according to a desired function is obtained. The resilient rigidity as an absolute value can be set by means of the thickness of the parts of the damping element (legs, connection sections, intermediate carrier); as already mentioned, also the angle, under which the leg meets the intermediate carrier, can be used for the design and adjustment.

[0021] The production of the proposed damping element and of the shoe as a whole is possible in a simple way and at low cost, for which known methods are used.

[0022] Exemplary embodiments of the invention are depicted in the drawing, in which:

[0023] FIG. 1 shows a damping element in a perspective view,

[0024] FIG. 2 shows the rear part of the shoe in the side view,

[0025] FIG. 3 shows the section A-B according to FIG. 2 and

[0026] FIG. 4 shows an alternative embodiment of the damping element according to the invention, similar to FIG. 1.

[0027] In FIG. 1 a damping element 3 is depicted which is integrated into a sports shoe. The integration into a shoe is shown in FIG. 2 for a similar damping element 3. Only the heel region is depicted here; however, analogue explanations are applicable as well for the fore-foot region, in which also a damping element according to the invention can be integrated. Furthermore, it is possible that a single damping element 3 is arranged, which extends along the whole length of the shoe.

[0028] The damping element 3 according to FIG. 1 has two groups 4 of damping bodies 5 and 10 respectively. A number of damping bodies 5 and 10 respectively are arranged side by side and contact each other in locations of conjunction 15 and 16 respectively. The damping bodies 5, 10 are bowl-shaped in the embodiment, i.e. each damping body 5, 10 has two legs 6, 7 and 11, 12 respectively, which are connected by a connection section 8 and 13 respectively. The connection section 8 and 13 respectively and two legs 6 and 7 and 11 and 12 respectively thus form a damping body 5 and 10 respectively, which have the shape similar to a U in the profile, i.e. viewed from the side.

[0029] The upper group 4 of damping bodies 5 and the lower group 9 of damping bodies 10 are in each case connected to an intermediate carrier 14, wherein the intermediate carrier 14 is substantially flat, but can have a slightly waveform in longitudinal direction L of the damping element 3. I.e. the locations of conjunction 15 and 16 respectively of adjacent legs 6, 7, 11, 12 are connected with the intermediate carrier 14.

[0030] As can be seen furthermore, the respective locations of conjunction 15, 16 are offset in longitudinal direction L. The locations 15 of the upper damping bodies 5 are positioned in the middle between two locations of conjunction 16 of the lower damping bodies 10. This is applicable for the locations of conjunction 16 as well, which are respectively centered between two locations of conjunction 15.

[0031] By this embodiment a damping element is created which spring and damping properties can be defined beneficially and reproducibly. For the specific definition of spring and damping properties especially the angle α can be used

(see FIG. 1) which defines how the legs 6, 7, 11, 12 meet the intermediate carrier 14. Preferred values for the angle lie between 50° and 80°.

[0032] In FIG. 2 it can be seen how such a damping element 3 is integrated into a shoe with a shoe upper part 1 and a sole 2. The damping element 3 is not flat here (as in FIG. 1) but it follows the course of the heel of the wearer of the shoe.

[0033] By the depicted height h it can be seen that the damping element 3 extends till a region upwards which is about the half of the entire height H of the shoe in the heel region.

[0034] The damping element 3 according to the embodiment of FIG. 2 is arranged at the bottom side of a heel shell 20, which is adapted to the form of the heel of the wearer of the shoe. At the bottom side of the damping element 3 an outer sole 21 is located which covers the damping element 3 from the bottom side.

[0035] As can be seen in the section A-B according to FIG. 2, which is shown in FIG. 3, the damping element 3 extends in the embodiment not across the whole width of the shoe. Rather the damping element 3 extends only in the two side regions 17 and 18, leaving an omitted region in the middle section 19. However, this omission can also be arranged only in a part of the sole, wherein other regions of the sole can be supplied then holoheral with the damping element 3.

[0036] The damping element 3 is preferably formed as a one-piece injection molding part (preferably made from EVA). It can then be glued with the heel shell 20 and the outer sole 21 respectively and inserted into recesses respectively which are arranged in the sole 2 for this purpose.

[0037] The variation of the damping element 3 shown in FIG. 4 is basing on the same inventional concept like the solution according to FIG. 1. While in the pre-described solution the single damping bodies 5 and 10 of both groups 4 and 9 are arranged symmetrically to an imaginary middle plane—at least for a part of the damping bodies 5, 10—this is not the case for the solution according to FIG. 4. As can be seen regarding the depicted angles α' and α'' an asymmetric arrangement is given. The angle α' is curtly below 90°, while the other angle α'' is about 60°. The mentioned angles α' and α'' are again those angles by which the extension of the legs 6, 7 and 11, 12 respectively is directed against the plane of the intermediate carrier 14 and an imaginary horizontal respectively.

[0038] It can be seen furthermore, that the connection sections 8 and 13 respectively—specifically the upper connection sections 8—have a short extension only regarded in the longitudinal direction L of the shoe and the damping element 3 respectively. To a certain extends the connection sections 8, 13 are connection points (or connection lines running along the width of the shoe) by which the legs 6, 7 and 11, 12 respectively are connected to another. As can be seen, the transition from one leg to the other can be formed as a corner arc, which is addressed as connection section 8, 13 in this case.

[0039] Also in this case an incision can be arranged into the damping element 3 in the region facing the ground. The incision needs not necessarily extend into the longitudinal direction L, i.e. like a longitudinal groove. It is also possible, that the incision has e.g. an elliptic or kidney-shaped contour regarded from the ground.

[0040] The proposed damping element 3 can be arranged only in the rear-foot region, i.e. especially below the heel. As an alternative or as an addition it can also be arranged that

such a damping element is located in the fore-foot region. Finally, the damping element of the mentioned kind can extend long the whole length of the shoe.

LIST OF DESIGNATIONS

[0041]	1 shoe upper part
[0042]	2 sole
[0043]	3 damping element
[0044]	4 first, upper group of damping bodies
[0045]	5 damping body
[0046]	6 leg
[0047]	7 leg
[0048]	8 connection section
[0049]	9 second, lower group of damping bodies
[0050]	10 damping body
[0051]	11 leg
[0052]	12 leg
[0053]	13 connection section
[0054]	14 intermediate carrier
[0055]	15 location of conjunction
[0056]	16 location of conjunction
[0057]	17 side region
[0058]	18 side region
[0059]	19 middle section
[0060]	20 heel shell
[0061]	21 outer sole
[0062]	L longitudinal direction
[0063]	α ,
[0064]	α' ,
[0065]	α'' angle
[0066]	h height
[0067]	H total height of the shoe

1.-25. (canceled)

26. Shoe comprising a shoe upper part, a sole, and a damping element arranged above or in the sole, wherein

the damping element comprises:

a first, upper group of damping bodies having a substantial U-shaped or bowl-shaped cross section, wherein each of the upper damping bodies have two legs which are connected with a connection section,

a second, lower group of damping bodies having a substantial U-shaped or bowl-shaped cross section, wherein each of the lower damping bodies have two legs which are connected with a connection section,

an intermediate carrier which is arranged between both groups of damping bodies and to which the legs abut with their end being remote from the connection section or with which the legs are connected,

wherein adjacent legs of the respective damping bodies are abutting or are connected at a location of conjunction,

wherein the locations of conjunction of the upper and of the lower damping bodies are offset in longitudinal direction of the damping element,

wherein the intermediate carrier is formed as a substantial flat, panel shaped part or it has a wavelike or kink-shaped run in longitudinal direction of the damping element,

wherein the legs extend substantially linear and meet the intermediate carrier with an angle between 45° and 89° to the plane of the intermediate carrier or to the horizontal,

wherein the legs and the connection sections of the damping bodies extend as a flat part at least along a part of the width of the shoe and form cavities, and

wherein the extension of the cavities run substantially perpendicular to the longitudinal direction of the damping element.

27. Shoe according to claim 26, wherein the locations of conjunction of one of the damping bodies are arranged in the middle between two locations of conjunction of the other damping bodies regarded in longitudinal direction of the damping element.

28. Shoe according to claim 26, wherein the damping bodies are formed at least partially symmetrically to a middle plane in cross section.

29. Shoe according to claim 26, wherein the damping bodies are formed at least partially asymmetrically to a middle plane in cross section.

30. Shoe according to claim 26, wherein the damping element has an incision in the region being turned toward the ground.

31. Shoe according to claim 26, wherein the legs and the connection sections of the damping bodies extend as a flat part along the whole width of the sole.

32. Shoe according to claim 26, wherein the legs and the connection sections of the damping bodies extend as a flat part only along the side regions of the sole and leave an omitted region in the middle section.

33. Shoe according to claim 26, wherein the connection sections of the damping bodies have at least partly a short extension in longitudinal direction.

34. Shoe according to claim 33, wherein the connection sections are formed substantially as a punctual location of conjunction of the legs in cross section.

35. Shoe according to claim 34, wherein the connection sections are formed as a rounded transition of the legs.

36. Shoe according to claim 26, wherein at least one damping element is arranged only in the rear-foot region of the shoe.

37. Shoe according to claim 26, wherein at least one damping element is arranged each in the fore-foot region and in the rear-foot region of the shoe.

38. Shoe according to claim 26, wherein a clamping element extends from the end at the heel side of the sole.

39. Shoe according to claim 26, wherein the damping element is arranged at the bottom side of a heel shell.

40. Shoe according to claim 26, wherein an outer sole is arranged at the bottom side of the damping element.

41. Shoe according to claim 26, wherein the connection sections of the bottom damping bodies are formed as a segmented outer sole.

42. Shoe according to claim 26, wherein the damping element extends to the rear end of the shoe and turns around the heel upwards.

43. Shoe according to claim 42, wherein the damping element extends until a height from 40% till 75% of the total height of the shoe in the heel region.

44. Shoe according to claim 40, wherein the outer sole extends at least along the whole region along which the damping element extends.

45. Shoe according to claim 44, wherein the outer sole extends beyond the region of the damping element.

46. Shoe according to claim 26, wherein both groups of damping bodies as well as the intermediate carrier are made as a one-part injection molding part.

* * * * *