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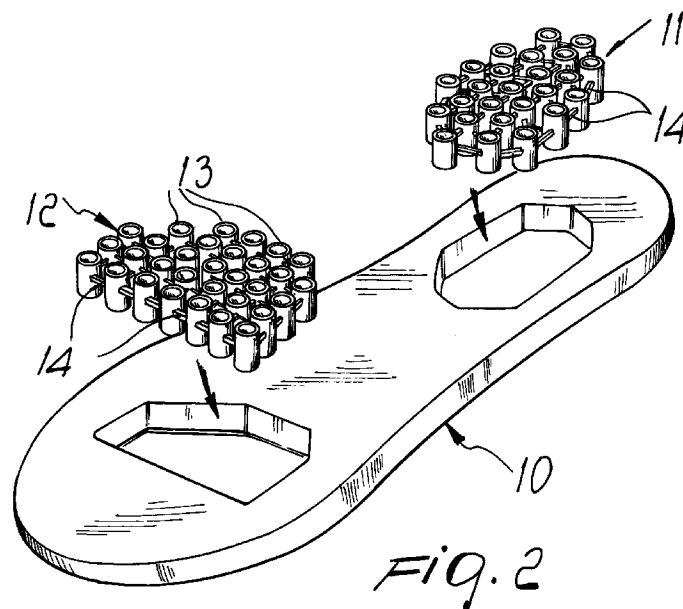
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(54) Shock-absorbing device particularly for shoes

(57) A shock-absorbing device (11,12), particularly for shoes, comprising, included within the mid-sole (10), at least at the heel region, a plurality of hollow elements (13), made of elastomer and connected by bridges (14), each whereof is internally shaped so as to form, upon

assembly, two superimposed chambers which are mutually connected by a duct; the duct has a smaller cross-section than the chambers and forms a constriction for passing air flows.



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Description

The present invention relates to a shock-absorbing device particularly for shoes.

It is known that contact of the foot with the ground, even in normal walking, usually causes a more or less intense trauma in the foot.

In particular, the trauma is caused by the weight of the body, which is suddenly discharged onto the sole of the foot and then inside the structure of the foot.

The sudden weight discharge is also particularly intense if contact with the ground is violent, as occurs for example in some sports practices, such as volleyball, basketball, athletics, tennis or the like.

Some form of cushioning of the momentary stress is normally entrusted to a mid-sole made of flexible material in order to prevent prolonged and perhaps particularly violent momentary stresses from causing traumas or internal inflammations of the foot.

However, mainly for sports or in any case for situations in which the foot is intensely stressed, the presence of a flexible mid-sole is usually insufficient.

In order to improve cushioning of the momentary stress caused by contact of the foot with the ground, many shock-absorbing devices have been produced and marketed whose function is indeed to absorb the momentary energy when the foot makes contact with the ground.

Although various embodiments are possible, two basic shock-absorbing devices can be substantially distinguished.

A first device entails the insertion in the mid-sole (or even directly in the sole) or association therewith of one or more elastic elements which cushion the momentary stress.

In practice, this device is effective only up to preset momentary stresses; if its intrinsic constructive limit is passed, a packed condition of the device is obtained, wherein its shock-absorbing characteristics are suddenly disabled.

The packing is also transmitted to the foot as a particularly violent stress, since it forces the sole of said foot to pass from a flexible condition to a condition in which it suddenly rests on a very hard surface.

Packings in fact usually show up as a particularly quick transition from a flexible situation to a totally rigid situation.

A second kind of device entails providing cells or chambers wherein a fluid is present, which is adapted, owing to its viscosity characteristics and in association with the flexibility of the walls of the chamber, to absorb the momentary energy during contact of the foot with the ground.

However, it is known from fluid mechanics that in particular conditions, which substantially coincide with particularly quick ground contacts with extremely momentary stresses, an apparent hardening of the surface of the fluid occurs; the fluid is thus no longer able to

perform its absorbing function.

The principal aim of the present invention is to provide a shock-absorbing device which solves the above-described drawbacks of conventional devices, particularly by providing an effective absorption of the momentary stress of contact of the foot with the ground, whilst avoiding packings or in any case rapid transitions from a condition in which the device is highly flexible to conditions in which sudden stiffenings can occur.

Within this aim, an object of the present invention is to provide a shock-absorbing device which is particularly effective even in situations in which the momentary stress is particularly short and violent, as occurs for example in sports practices or other activities which entail similar problems.

Another object of the present invention is to provide a device which can be associated in particular with various mid-soles and can be easily adapted to various shoes.

Another object of the present invention is to provide a shock-absorbing device which is particularly flexible in its application, so that it can be applied to various and different regions of the insole.

Another object of the present invention is to provide a shock-absorbing device which has a competitive cost with respect to conventional devices and can be manufactured with conventional technologies.

This aim, these objects and others which will become apparent hereinafter are achieved by a shock-absorbing device, particularly for shoes, characterized in that it comprises, included within the mid-sole, at least at a heel region, a plurality of hollow elements made of elastomer and connected by bridges, each of which is internally shaped so as to form, upon assembly, two superimposed chambers which are mutually connected by a duct, said duct having a smaller cross-section than said chambers and forming a constriction for passing air flows.

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

figure 1 is a perspective view of a device according to the present invention, associated with a mid-sole;

figure 2 is an exploded view of the mid-sole with the device according to the invention of figure 1;

figure 3 is a sectional view of the device according to the present invention;

figures 4 and 5 are sectional views of the device of figure 3 shown in two operating steps.

With particular reference to figures 1 to 5, a mid-sole generally designated by the reference numeral 10 includes, at the heel and metatarsal regions, two shock-absorbing devices according to the invention, generally

designated by the reference numerals 11 and 12.

More specifically, each one of the devices 11 and 12 comprises a plurality of hollow cylindrical tubular elements 13 arranged, upon assembly, so that their axis is vertical; the elements 11 and 12 are made of elastomer and are mutually connected by bridges 14.

The cylindrical tubular elements 13 and the corresponding bridges 14 are monolithic with respect to each other.

Each one of the cylindrical tubular elements 13 is internally shaped so as to form, upon assembly, two open and superimposed chambers 15 which are mutually connected by a duct 16.

The duct 16 is substantially axial with respect to the corresponding tubular element 13 and has a much smaller cross-section than the corresponding chambers 15.

In practice, operation of the device is as follows and is clearly shown in particular in figures 4 and 5.

When the foot, shown schematically in those figures by a dashed line 17, rests on one of the devices 11 or 12, it produces the deformation (compression) of the upper chambers 15.

The compression of the upper chambers 15 causes the air contained therein to be transferred, through the duct 16, to the corresponding lower chambers 15.

Since the cross-section of the duct 16 is smaller than the cross-section of the chambers 15, it produces a constriction which slows the air flow from one part to the other and damps the energy of the impact.

When the foot 17 instead rises and discharges the upper chambers 15 by means of the opposite effect, the chambers aspirate the fluid transferred into the corresponding lower chambers 15, again through the duct 16.

The flow of the fluid (air) through the duct 16, which has a particularly narrow cross-section with respect to the chambers 15, causes a particularly effective dissipation of the momentary energy of the contact of the foot with the ground without however causing unwanted packings or sudden hardenings of the devices 11 or 12.

In practice, it has been observed that the present invention has achieved the intended aim and objects.

In particular, it should be noted that the shock-absorbing device according to the present invention, while being structurally simple, solves in an excellent and effective manner the problem of cushioning the momentary stress caused by contact between the foot and the ground without however exhibiting unpleasant packing effects or sudden transitions from suitable flexibility to sudden structural rigidity.

It should also be noted that the shock-absorbing device according to the present invention is particularly simple to insert in a mid-sole and can be arranged in various and different regions, which correspond to equally various regions of the sole of the foot.

The high flexibility of the device according to the present invention should also be noted; the device can

be applied to different shoes related to the most disparate activities and situations.

The full reversibility of the device according to the present invention when the postural stress is discharged should also be noted.

The present invention is susceptible of numerous and various modifications and variations, all of which are within the scope of the inventive concept; likewise, the constructive details may be replaced with other technically equivalent elements.

The materials and the dimensions may be any according to requirements.

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 interpretation of each element identified by way of example by such reference signs.

Claims

1. A shock-absorbing device, particularly for shoes, characterized in that it comprises, included within the mid-sole, at least at a heel region, a plurality of hollow elements made of elastomer and connected by bridges, each whereof is internally shaped so as to form, upon assembly, two superimposed chambers which are mutually connected by a duct, said duct having a smaller cross-section than said chambers and forming a constriction for passing air flows.
2. A device according to claim 1, characterized in that each one of said hollow elements is cylindrical and is arranged so that its axis is vertical with respect to said mid-sole.
3. A device according to claim 1, characterized in that said chambers are open.
4. A device according to claim 1, characterized in that said hollow elements and the corresponding bridges are mutually monolithic.
5. A device according to one or more of the preceding claims, characterized in that said bridges are arranged so as to connect median regions of said hollow elements.
6. A device according to claim 1, characterized in that it is located at a metatarsal region of the sole of the foot.

