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(54) Shoe with inner sole with improved shock absorption.

(57) Shoe with inner sole, especially a training shoe, wherein the inner sole consisting of shock absorbing material contains one or more buffers having a hardness which is at least 5 Shore A units higher than that of the inner sole. The buffers, preferably present at the heel side of the shoe, are preferably curved with a wedgelike shape, the base coinciding with the underside of the sole and the smaller upperside with the upper part of the sole. Figure 1 illustrates such a shoe.

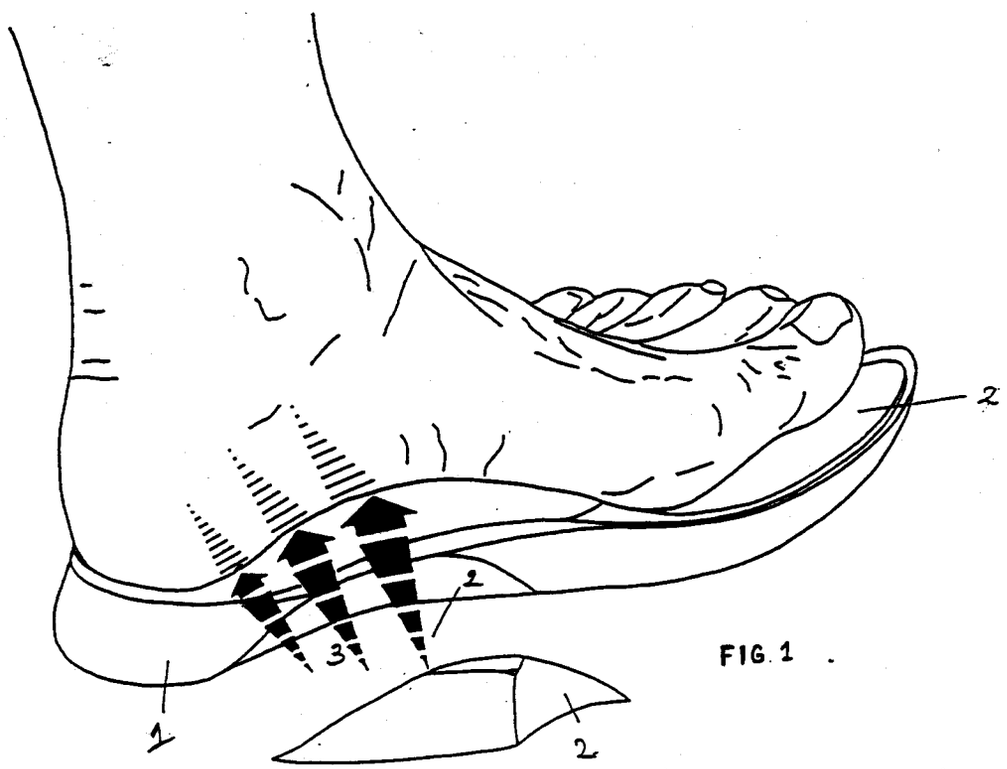

FIG. 1

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The invention relates to a shoe with inner sole, especially a walking shoe or training shoe, which inner sole is made from shock absorbing material, designed to accept forces which act on the foot during a more than usual strain, such as during sporting and jogging or during sudden movements. Such an inner sole often is made from EVA or polyurethane. However, the shock absorbing power in a number of cases is not as one should wish because by many people the foot is stressed to much at the inner side or at the outer side, which especially for sporting people creates problems. Generally, the foot is for 80% of the sporters too much stressed at the inner side and for 10% too much at the outside, mentioned overpronation and oversupination respectively. Thus injuries can arise.

The invention is directed to a shoe with inner sole, especially a walking shoe or sporting shoe, wherein the above mentioned disadvantage is avoided as much as possible because the inner sole is designed so that in the development fase of a step or jump a gradual progression of counterpressure arises at places where a need therefore exists and in connection therewith a selective damping effect is obtained. Thus, the invention has as an object to provide a shoe with inner sole, whereby in the inner sole, especially in the heel-part, separate socalled "buffers" are inserted which are shaped and placed so that at the first ground contact the necessary damping of the inner sole is not inhibited, but which in the development fase after the first ground contact exert a gradual progression of counterpressure as a consequence of which the foot obtains a better guidance and is corrected.

Thus the invention relates to a shoe with inner sole, especially a walking shoe and sporting shoe, wherein the inner sole exists of shock absorbing material, which is characterized in that in the inner sole one or more buffers as defined are present, having a hardness which is at least 5 Shore A units higher than that of the inner sole and which for the greater part are arranged at the heel side of the inner sole. Preferably the buffers are present medially and/or laterally. It is necessary that the buffers have a higher hardness than the remainder of the material of the inner sole. This difference in hardness should be so that in the development fase a counter pressure arises, especially a gradual increase of the counter pressure on places where the buffer is arranged. This can be reached if the hardness of the buffers is at least 5 Shore A units higher than that of the inner sole wherein they are inserted and is at least 10-15 to 20 Shore A units higher, dependent of the hardness of the material of the inner sole which may vary for a certain type of shoe (and shoe size). For a sporting shoe these values are generally in the area of circa 40 tot 45 Shore A. The hardness of the buffers also is adjusted in the range of the aforementioned values, thus about 45-65, suitably 45-55, dependent of the type of shoe and the hardness of the inner sole.

For shoes for children naturally the difference in hardness will be chosen smaller than for shoes with a bigger size.

The buffers according to the invention are continuously inserted in the inner sole and have a smooth curved shape with bent or curved side faces which run to a sharp top from a relatively broad base surface or which terminate in a relatively small upper face in the inner sole. The number of sides is preferably minimal, i.e. two sides, when the buffer is completely inserted in the inner sole and is not in the neighbourhood of the edges. The buffer has a shape which is comparible with a slice of orange. If, however, the buffer is present along the side face, thus medially or laterally, which often has preference, then there are three possible sides, especially at the transition of sole and heel part of the inner sole, wherein the one side more or less is separated in two, mainly straight parts by the transition as indicated above. These sides follow the circumference of the sole. The buffer then mostly possesses a small upper face of which one corner is the said transition part. The buffer can then be compared with a truncated pyramid or prism with curved sides.

The height of the buffer may suitably be somewhat smaller than the height of the inner sole at that place, so that the buffer is totally imbedded in the sole or only the top of the buffer is lying in the upper face of the sole. It is, however, also possible that the small upper face of the buffer is present in the upper face of the sole or coincides therewith.

The buffers can exist of any resilient material which possesses the desired hardness. Also the same material as that from the inner sole may be used provided that it is subjected to an additional treatment (for instance additional curing) to increase the hardness to the desired value. The buffers may for instance be made by casting the desired material in a mould, whereafter they are inserted in a mould for the inner sole at the places desired and then the inner sole can be casted.

The curvature of the sides is chosen so that a gradual counterpressure arises when the inner sole is pressed in. The curvature can be both convex and concave, except for the edge buffers where the outer sides follow the curvature of the sole.

Generally no more than one buffer in the inner sole is sufficient, and as appears from the above preferably at the inner side of the foot. However, it is also possible to locate a buffer both medially and laterally, which then suitably is somewhat smaller than if one buffer is present. Furthermore, a buffer may be present in the neutral position, if desired.

The two buffers at the lateral and medial side may also differ in size.

It is to be understood that the buffer is part of the inner sole and generally occupies a small percentage of the inner sole upper and lower face. Of course the buffer especially at the under side should be sufficiently large to be able to exert the desired counterpressure. Fixed limits are difficult to indicate, but from the figures one can see that the length of the buffer, as well as the heel part, could be more than half of it and that it is always a certain distance apart from the end heel part of the sole. In a suitable embodiment the buffer is situated at the inner side or the medial side of the inner sole in the transition area between foot cavity and heel, preferably about the shape of a curved wedge which possesses a small upper surface which coincides with the upper face of the inner sole.

It is to be understood that the height and the length of the buffers may vary and that these are related to the different purposes for which the shoe is meant. Generally, these dimensions are determined by trials and then standardized in the shoe.

The invention will now be illustrated by the added drawings wherein figure 1 generally indicates by means of the arrows how the gradual increase of the counterpressure is exerted on the cavity of the foot. Figure 2 is a plan view of an inner sole of the left hand foot. Figure 3 is an elevational view of a inner sole of the left foot. Figure 4 is a buffer according to the invention as present in the inner sole of figures 2 and 3. Figure 5 is a view of an inner sole for the left hand foot and figure 6 is the buffer present in this inner sole.

Figure 1 schematically indicates that the buffer as applied exerts counterpressure on the foot cavity, for instance during jumping. In the drawing the shoe is not shown and therein is 1 the inner sole, mostly existing of EVA while 2 is the buffer. The arrows 3 indicate the forces exerted on the foot. In figure 2 1 is also the inner sole, wherein 3 represents the upper part of the buffer and the broken line 4 the lower circumference. Buffer 3 is visible in figure 3 in elevational view while in figure 4 the buffer is shown separately from the inner sole. One can also see the bent wedge shape. In figure 5 again an inner sole 1 is shown wherein now a buffer 5 is present, which does not run totally to the upper face of the inner sole. In figure 6 this buffer is drawn separately.

The present shoes are suitable for different sports, like tennis, running, walking, skating etc.. The material of the buffer exists of as such well-known shock absorbing material which is suitably of the same type as that for the inner sole, of which however the hardness, like of plastic, as mentioned is at least 5 Shore A larger. The inner soles can be separately supplied after, as already mentioned, for instance by casting, the buffers are inserted therein, which buffers are separately made for instance also by casting.

Claims

1. Shoe with inner sole of shock absorbing material arranged to accept forces acting on the foot, especially walking shoes and sporting shoes, characterized in that in the inner sole mainly at the heel part one or more buffers, as defined, of a material which is at least 5 Shore A units harder than the material of the inner sole are inserted, which are arranged in the inner sole so that they can develop a desired counterpressure at a load of the type of overpronation and oversupination.

2. Shoe according to claim 1, characterized in that the buffer is placed laterally and/or medially.

3. Shoe according to claims 1-2, characterized in that the buffer is a wedge form with curved sides, of which the base coincides with the lower part and the smaller upper part with the upper side of the sole.

4. Shoe according to claims 1-3, characterized in that the buffer is imbedded in the inner sole.

5. Shoe according to claims 1-4, characterized in that the buffer is located in the transition area between foot cavity and heel and possesses one or more right sides coinciding with the transition area of the foot sole.

6. Shoe according to claims 1-4, characterized in that the buffer is placed in the neutral zone.

7. Shoe according to claims 1-6, characterized in that the hardness of the buffers is no more than 10-15 Shore A units higher than that of the inner sole and amounts maximally to 65 Shore A units.

8. Shoe according to claims 1-7, characterized in that the buffers are shaped and placed so that at the first ground contact the required damping is not inhibited.

9. Inner sole of shock absorbing material provided with buffers to be used in a shoe according to claims 1-8.

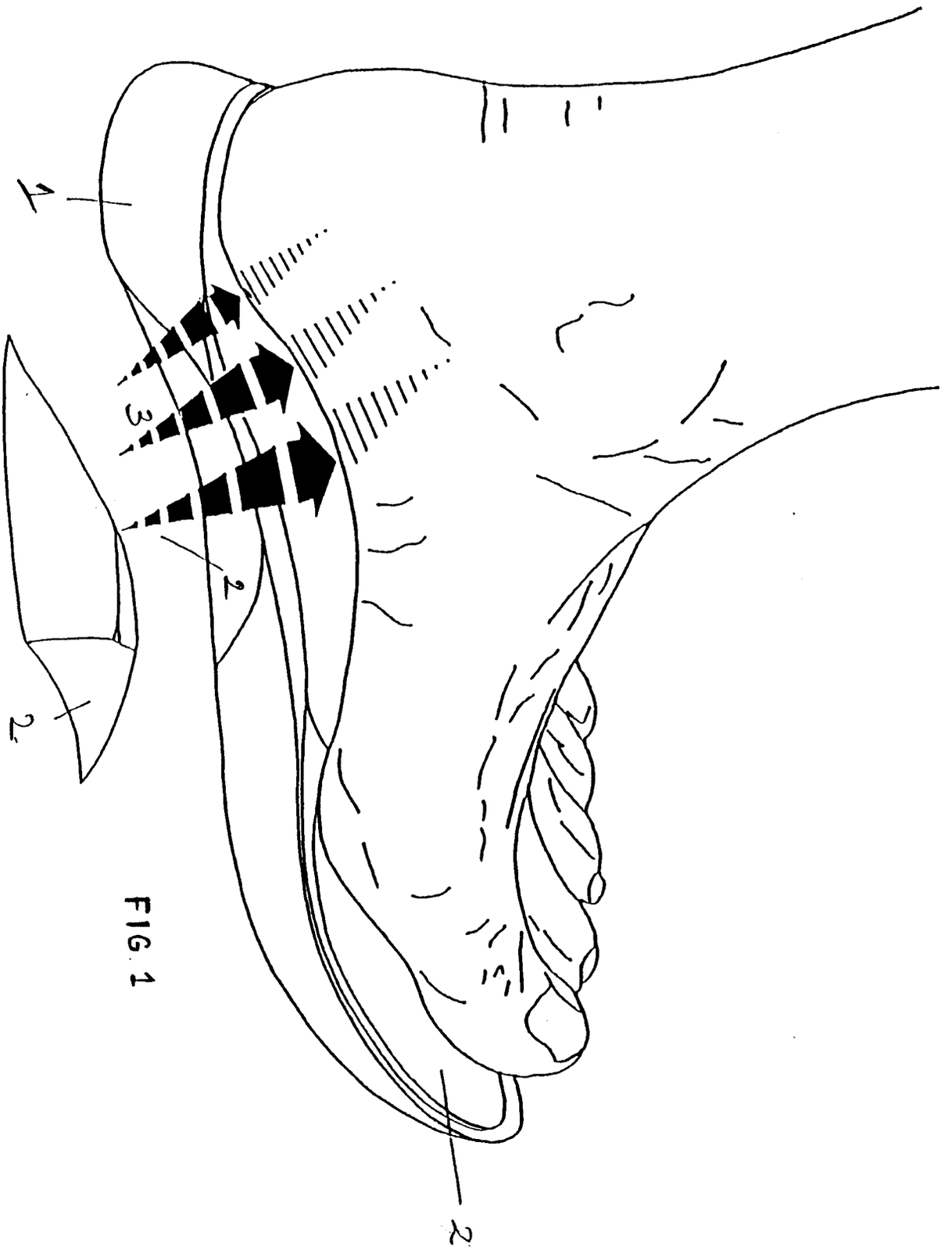

FIG 1

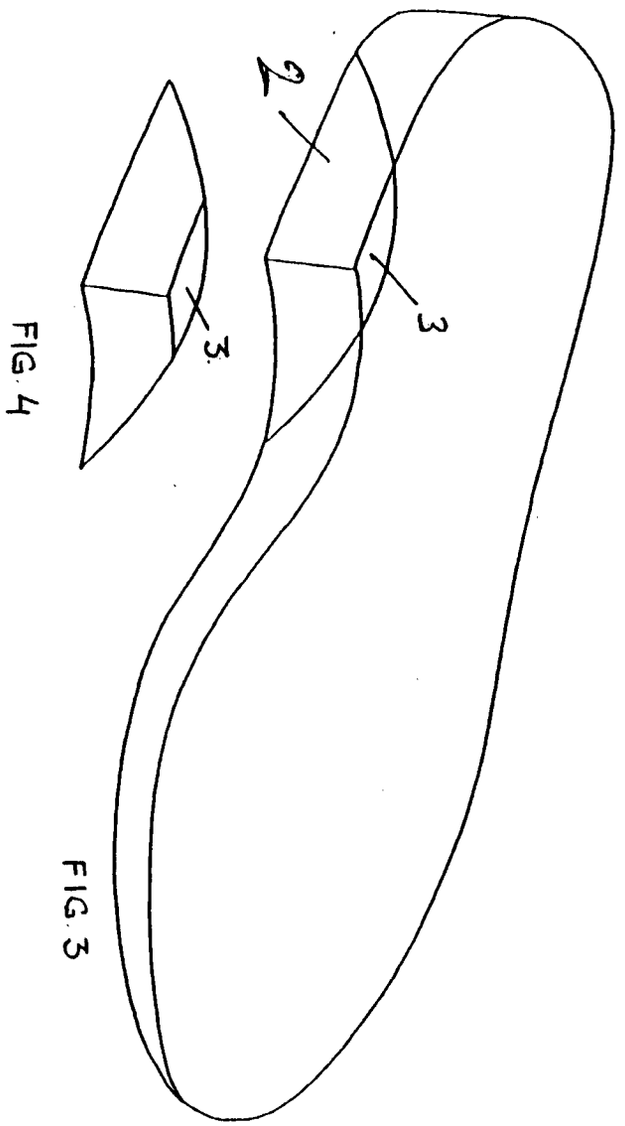

FIG. 4

FIG. 3

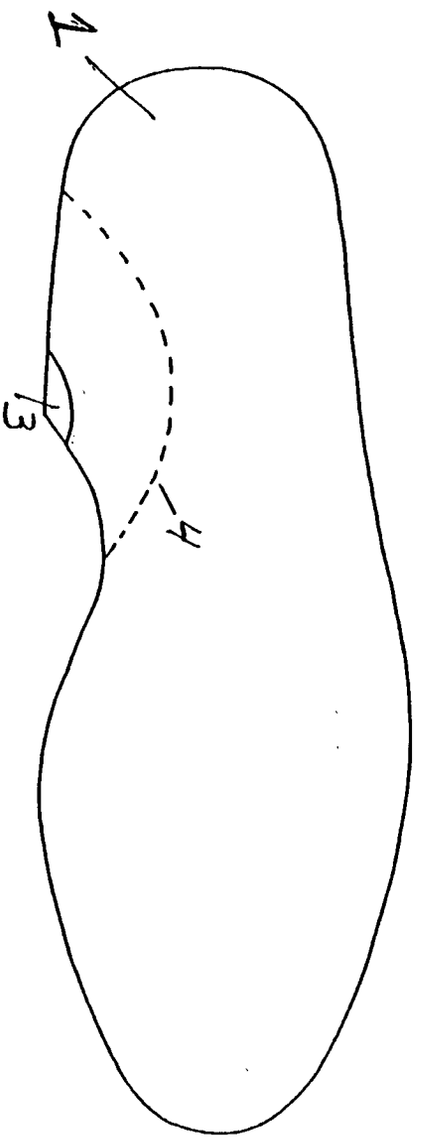

FIG 2

FIG. 6

FIG. 5