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[33]		Germany
[31]		P 19 16 935.8

[56]

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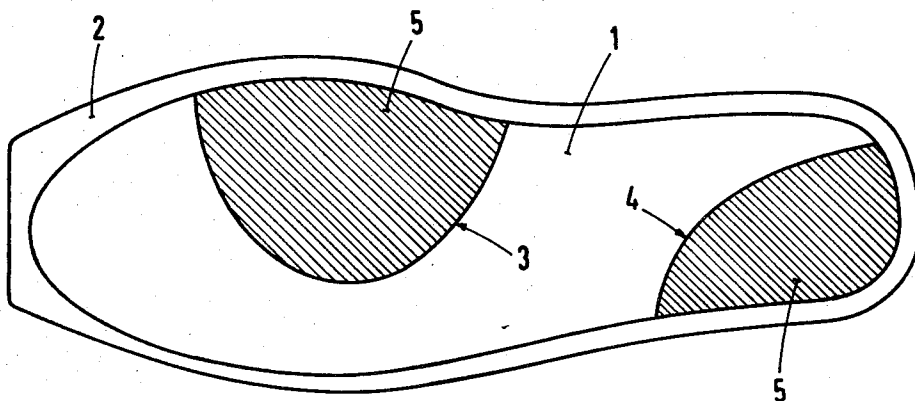
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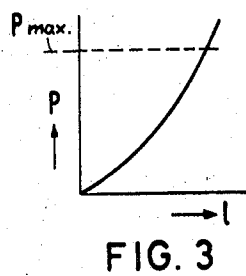
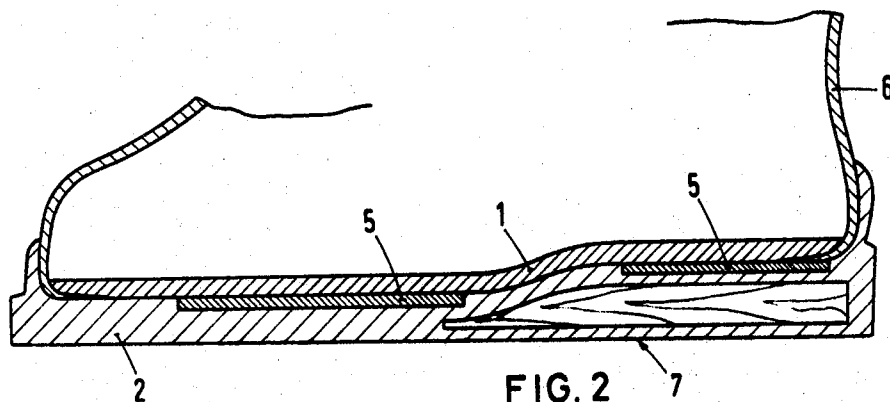
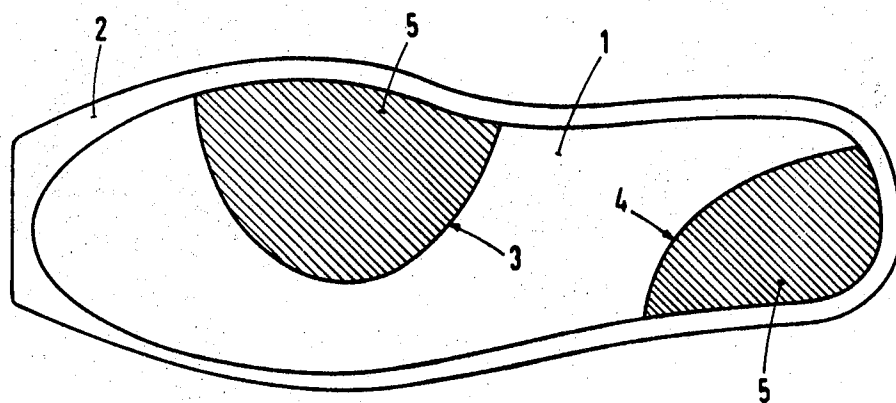
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[54] FOOTWEAR
7 Claims, 5 Drawing Figs.

[52]	U.S. Cl.	36/44, 36/2.5 AL
[51]	Int. Cl.	A43b 13/38
[50]	Field of Search	36/2.5, 43, 44

ABSTRACT: The invention relates to an article of skiing footwear wherein in order to damp or absorb impacts on the bone structure of the skier, there is provided in association with the sole a layer which, as distinct from known sole elements made from cellular plastics, is capable of further compression even under maximum shock loading, and the resilience of which in the zone of such maximum shock loading is greater than that of the remaining boot or shoe base under similar loading.





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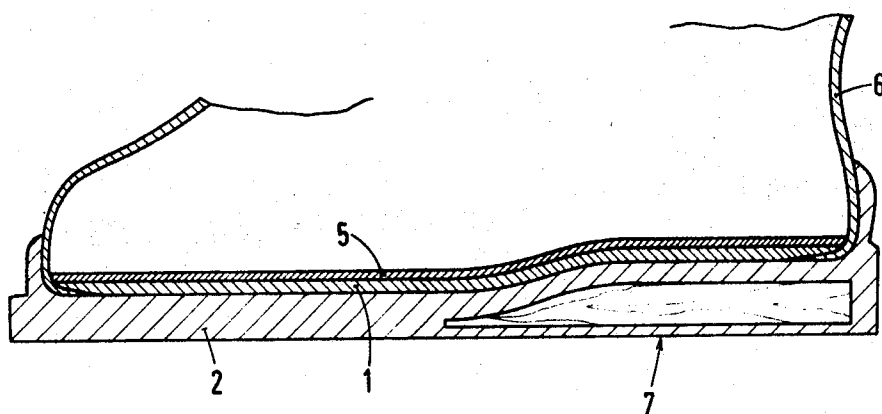


FIG. 4

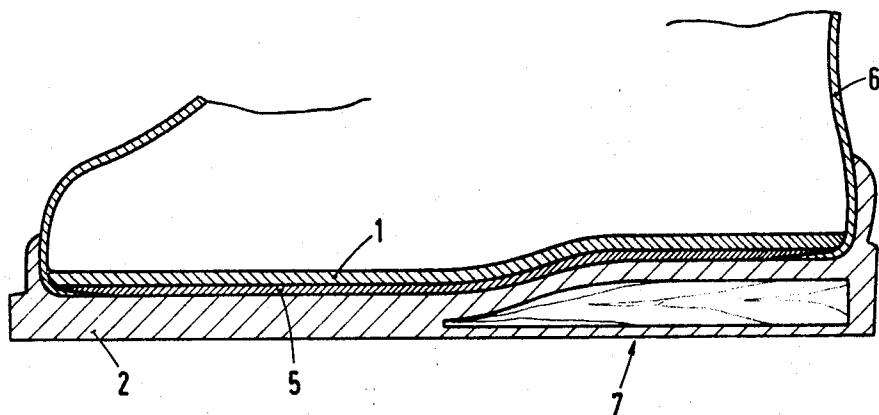


FIG. 5

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FOOTWEAR

The present invention relates to a skiing boot or shoe.

In ski boots or shoes cushioning has previously been provided in particular in the zone of the upper, made from cellular plastics materials and serving to improve the "bedding" of the foot in the boot or shoe and to damp or absorb and distribute pressure, for example the pressure of buckle or clasp type closures.

In the event of the cushioning being too resilient, the wearer experiences a "floating feeling" which opposes the direct transmission of the foot movement to the boot. Thus, in the sole area, the cushioning is made sufficiently soft and/or thin to ensure that, even under static loading due to the weight of the skier, it is already compressed up to the limit of its deformability.

However, during skiing, there are frequently imparted to the sole shock loads which may greatly exceed the weight of the wearer's body. The cellular plastics layers used hitherto, the resilience of which is completely exhausted even under static loading, are no longer able to absorb such shocks. The impacts, which in particular in the ball and/or heel area act on the outsole face of the skiing boot, and therefore transferred, almost undamped, to the bone structure of the skier and, in course of time, this may result in permanent damage to the interarticular disc, stiffening of the muscular system of the hip, or the like.

According to the present invention there is provided a skiing boot or shoe having associated with at least a portion of the inner sole thereof a layer of shock-absorbing material arranged so that mechanical shocks may be absorbed by the resilience of the material in a direction transverse of the inner sole without substantial deformation of the sole in a direction in its plane, said shock-absorbing material having a compressibility in said transverse direction which remains constant or decreases upon increasing loading. The shock-absorbing layer provided on a ski boot of the invention has, in the appropriate range of loading, a substantially constant or slightly decreasing resilience characteristic, and its resilience is preferably not exhausted even under the maximum shock loading occurring during skiing, so that any suddenly arising impact is absorbed by resilient deformation of the layer. Owing to the deformation work requiring to be performed on the resilient layer, the impact is transferred to the foot of a wearer with a substantially diminished amplitude, and is distributed over a period of time which correspondingly exceeds the duration of the impact.

The shock-absorbing layer is not intended to provide a soft cushioning which would diminish the secure "hold" of the foot in the boot. Thus firm abutment of the foot on the boot, and unretarded transmission of movement, are not impaired. The shock-absorbing layer is therefore only slightly compressed under the static load due to the weight of the wearer, and may have substantially the same degree of firmness as the cartilage substance of human bones.

A further characteristic of the shock-absorbing layer consists in that, even under maximum loading, it does not expand, or expands only negligibly, in the plane of the layer, so that the laterally abutting boot portions are not subject to any noteworthy compressive action and are therefore able, without substantial loading, to hinder the lateral expansion of the material. One material which does not satisfy these requirements is rubber which in the event of compression deflects laterally and retains its volume constant. If a layer of medium-hard rubber, such as would correspond to requirements in skiing, were to be introduced under the inner sole or into recesses formed therein, then the result would be buckling or tearing of the inner sole.

The maximum shock load taking place depends on the weight of the skier and on the type of skiing concerned. In the case, for example, of the slalom, the dynamic loading will differ from that encountered during downhill skiing or jumping. In special boots or shoes for the various types of skiing practiced by sportsmen, the maximum loading to be expected

will be taken into consideration when dimensioning the layer, in accordance with resilience characteristics and/or thickness. Furthermore, the dimensioning of the layer may be adapted to varying body weight and such variation of dimensioning may be utilized even in the case of boots of the same size. Owing to this wide range of possible loading and consequent variation of optimum dimensioning of the layer, the latter cannot be effectively limited numerically with reference to its resilience characteristic and/or thickness. The dimensioning requirement of a layer of the invention may be stated to be that the layer should be compressible beyond the maximum stated loading caused by the weight of the wearer, and preferably beyond the maximum shock loading encountered during skiing. The compressibility of the layer in the region of maximum loading is greater than the compressibility of the remainder of the boot base in the same loading region.

One example of a material which satisfies the requirements for a layer of the invention is cellular polyurethane. Other, preferably cellular, plastics substances may however be used, provided that they satisfy these requirements.

A shock-absorbing layer of the invention may be arranged under and/or in and/or on the inner sole, and may, depending on the material used or on the arrangement selected, be simply inserted, stuck-in or directly foamed-on. In general, the layer will be arranged either under the inner sole or in recesses formed in the inner sole. The arrangement of the layer under the inner sole results in a reliable and firm posture of the foot of the wearer in the boot. The layer may be made continuous, i.e. so that it extends over the entire sole area, or it may be provided only in those areas which are especially subjected to pressure, i.e. in the ball and heel areas. It is also possible, in the case of continuous formation of the layer, to make the layer thicker in the ball and heel areas than in the remainder.

In order that the invention may be more clearly understood, the following description is given merely by way of example with reference to the accompanying drawing, in which:

FIG. 1 shows a plan view of an inner sole as seen from the interior of a boot or shoe, there being mounted in the inner sole a shock-absorbing layer in the preferred areas;

FIG. 2 shows a longitudinal section through the sole of a skiing boot or shoe, wherein the shock-absorbing layer is arranged below the inner sole;

FIG. 3 shows a diagram illustrating a resilience characteristic of a material from which a shock-absorbing layer may be manufactured;

FIG. 4 shows a longitudinal section through the sole of a skiing boot or shoe wherein a shock-absorbing layer is arranged on the upper surface of the inner sole covering the whole sole area; and

FIG. 5 shows a longitudinal section through the sole of a skiing boot or shoe wherein a shock-absorbing layer is arranged on the under surface of the inner sole covering the whole sole area.

Referring to the drawing, FIG. 1 shows a plan view of an inner sole 1 of a boot or shoe base having, for example, a molded-on outsole 2. In the area corresponding to the inner ball of the foot and in the outer heel area there are formed in the inner sole 1 arcuate recesses 3 and 4 in which layer elements 5 are mounted. Other shapes of layer elements arranged in or on the inner sole, such as rectangles, transversely extending webs, etc., may also be used.

FIG. 2 shows a longitudinal section through the sole of a skiing boot or shoe 6, wherein the layer 5 is arranged under the inner sole 1, in sections extending transversely of the longitudinal direction of the boot, and in the outsole 2. Any shocks impinging on the outsole surface 7 result in compression of the layer element 5 without the latter being able to deflect laterally, owing to its mounting in the outsole. It is therefore necessary that the layer elements should be compressible without simultaneous lateral expansion since, otherwise their resilience characteristic would vary in the direction towards a more rigid form of behavior.

The curve of FIG. 3 shows the resilience characteristic of one form of layer element 5 used for the purposes of the invention and made from cellular polyurethane. It will be appreciated that the compression increases only slightly in the zone of interest, and that under increasing loading P, the layer is compressed by the distance 1 whose rate of change with respect to P decreases only slightly so that 1 increases in almost linear fashion. At the maximum loading, designated P_{max} , which occurs in practice, the resilience characteristic still extends obliquely, i.e. the layer is still compressible even under this loading. Depending on the manner of representation of FIG. 2 the FIGS. 4 and 5 show two further examples in which a shock-absorbing layer covering the whole sole-area is arranged above or below the inner sole, respectively.

I Claim

1. An article of skiing footwear, comprising:
an inner sole and an outer sole, said inner sole being superimposed on said outer sole;
shock-absorbing material having the characteristics of resilient compressibility which remains constant or decreases during an increasing load thereon and resists lateral expansion during said increasing load thereon;
means defining an area on said footwear adjacent one surface of said inner sole for said shock-absorbing material, said shock-absorbing material substantially filling said area whereby shocks received by said footwear in a verti-

cal direction transverse to the plane of said inner sole may be absorbed by the compressible resilience of said shock-absorbing material without a lateral expansion of said shock-absorbing material, said lateral expansion characteristic of said shock-absorbing material being independent of said area provided therefor.

2. An article of skiing footwear according to claim 1, wherein said area and said shock-absorbing material filling same is disposed adjacent the inner ball of the foot of the wearer of said article in use thereof.

3. An article of skiing footwear according to claim 1, wherein said area and said shock absorbing material filling same is disposed adjacent the outer heel region of a wearer of said article in use thereof.

4. An article of skiing footwear according to claim 1 wherein said shock-absorbing material comprises a cellular plastics material.

5. An article of skiing footwear according to claim 4, wherein said plastics material comprises polyurethane.

6. An article of skiing footwear according to claim 1 wherein said shock-absorbing material is disposed below said inner sole in use of said article.

7. An article of skiing footwear according to claim 1 further comprising means defining recesses in said inner sole, said shock-absorbing material being disposed in said recesses.

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