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(54) **Asymmetric cap**

(57) This invention relates to toe caps and in particular to safety and protective toe caps. The toe cap 10a has the leading point 11a lying on the transverse toe axis, a trailing edge 13a through which a trailing axis 14 passes through the point 15a on the trailing edge 13a

which is nearest the toe axis and the cap is characterised in that a substantial portion of the trailing edge 13a extends rearwardly of the trailing axis 14 and is inclined thereto.

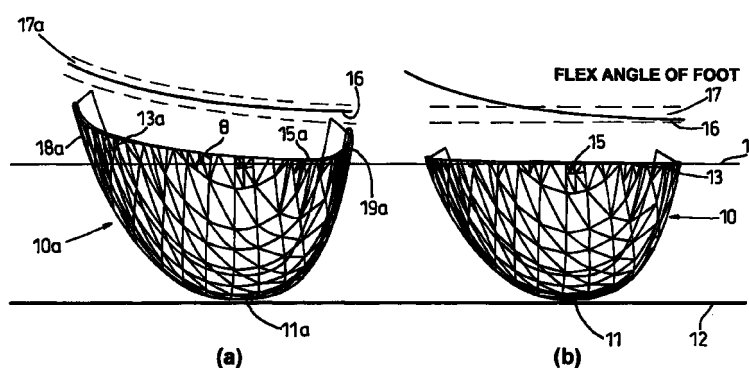


Fig. 1

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Description

[0001] This invention relates to toe caps and in particular to safety and protective top caps.

[0002] The design of safety top caps has remained substantially unchanged since at least the Second World War and they comprise a unitary steel body, which is generally U shaped in both vertical and horizontal section with the outer wall being slightly splayed. The trailing edge of this cap is cut straight across so that it is substantially parallel to a transverse axis extending through the leading point of the cap. The toe cap generally overlies a substantial portion of the user's big toe and lesser portions of the two adjacent toes. The third toe and the little toe are usually exposed. Whilst, in most situations, such a toe cap provides protection against falling weights, it provides limited side protection for the little toe and its adjacent toe and the toe cap tends to create a transverse crease in the footwear which digs into the middle phalanges of the user's toes rendering the footwear uncomfortable.

[0003] These problems have existed for decades, but have never been overcome.

[0004] From one aspect the invention consists in a safety or protective toe cap having a leading point lying on a transverse toe axis, a trailing edge through which a trailing axis passes along a line parallel to the toe axis and through the point on the trailing edge which is nearest the toe axis characterised in that a substantial portion of the trailing edge extends rearward of trailing axis and is inclined thereto.

[0005] The angle of inclination between the trailing edge and the trailing axis may initially be in the range of 4° to 10° and may subsequently increase. Indeed the angle of inclination may progressively increase as the trailing edge extends from the point or, alternatively, the increase in angle of inclination may take place adjacent the third toe position.

[0006] In any of the above cases the trailing edge may extend extensively parallel to the line of flexure of an intended user's foot.

[0007] The outer wall of the cap may extend to a point adjacent the little toe position of the intended user's foot and it is preferred that both the inner and the outer walls extend beyond the point.

[0008] In any of the above cases the trailing edge may be raked rearwardly as it extends along the wall portions of the toe caps.

[0009] From another aspect the invention consists in a toe cap having a trailing edge contoured to correspond substantially with the natural line of flexure of a human foot.

[0010] From a further aspect the invention includes a toe cap having an outer wall portion which extends rearwardly of its inner wall portion.

[0011] In any of the above cases the toe cap may be made of steel.

[0012] The invention also includes an article of foot-

wear incorporating a toe cap as defined above.

[0013] Although the invention has been defined above, it includes any inventive combination of the features set out above or in the following description.

[0014] The invention may be performed in a number of ways and a specific embodiment will now be described, by way of example, with reference to the accompanying drawings, in which:

Figures 1a and 1b are schematic views from above respectively of a toe cap incorporating the invention and a prior art toe cap;

Figures 2a and 2b are the equivalent side views of actual toe caps;

Figures 3a and 3b are views from above of the toe caps of Figure 2;

Figures 4a and 4b show the respective toe caps from above located on a last;

Figures 5a and 5b are the equivalent views from the outer side of the last; and

Figures 6a and 6b are the equivalent views from the inside of the last.

[0015] For the purposes of this specification and the following description "outside" refers to that part of a toe cap or shoe which is intended to extend on the side of the user's foot which bears the little toe and "inside" correspondingly refers to that side which equates to the user's foot that bears the big toe or hallux.

[0016] A prior art toe cap 10 is shown in Figure 1b and it will be seen that its foremost point 11 is abutted against a transverse axis 12. For the purposes of this specification the axis 12 will be denominated the "transverse toe axis". It will be noted that the trailing edge 13 of the toe cap 10 extends substantially parallel to the transverse toe axis 12 and indeed a trailing axis 14 can be defined which extends parallel to the transverse toe axis through the point 15 on the trailing edge which is nearest the toe axis.

[0017] When such a toe cap is built into an article of footwear, the upper of that footwear is flexed along the natural flex angle of the user's foot 16 and commonly this causes the upper to crease along a trough 17, which is parallel to the trailing edge 13 and which cuts across the flexure angle 16 of the foot. Particularly when such a crease 17 is formed in the tough materials that are often used in safety footwear, this can be extremely uncomfortable for the user.

[0018] The toe caps illustrated are of the size which would be used normally for footwear in the range 8 - 9½, and for a size 9 wearer, the toe cap 10 would extend substantially over the user's big toe and partially over the user's next two toes, leaving the remaining two toes almost completely exposed, particularly to side impacts.

[0019] Turning to Figure 1a, the Applicant's toe cap 10a has a trailing edge 13a which is inclined rearwardly from the trailing edge axis 14 from the nearest point 15a

towards the outside wall portion 18b. It will be noted that the angle of inclination θ , in this particular embodiment, becomes progressively greater so that the trailing edge 15a in fact substantially follows the line of the flexure or flex angle 16 of the user's foot. This change in design arises from the Applicant's appreciation that the nature of the crease formed in the footwear upper can be to an extent determined by the shape of the trailing edge of the toe cap. The result is that the crease 17a, which is formed by the Applicant's toe cap, substantially follows the flex angle 16 of the foot and the crease no longer digs into the user's foot in the manner that has existed for at least the last 50 years.

[0020] As can be seen in Figures 2, 4 and 5 the outer wall portion 18a is also raked rearwardly so that it can provide significant side protection, without moving the location of the crease 17a undesirably far back relative to the user's foot. A similar, but less substantial raking of the inner side wall 19a is also achieved.

[0021] As can be seen from the Figures, the design also provides more substantial coverage from above of the user's toes and typically the fourth toe is well protected with some protection, particularly from side impact being provided to the user's little toe.

[0022] The drawings in Figures 1a and 1b are substantially to scale and provide a good indication of the relative dimensions involved. It will be appreciated that different size toe caps will generate proportionally different dimensions.

[0023] It is generally preferred, particularly when a safety toe cap is being provided, that the toe caps are made of steel, but in fact the design may also work well as a plastics safety or protective toe cap, because, as can be seen in Figure 2, it allows a higher arch to be provided and this can be significant in plastics toe caps where a degree of deflection on impact is more likely to occur.

[0024] It should be emphasised that the top cap of this invention is principally an internal protective toecap, because it is in this situation that the problem of creasing particularly arises. External toecaps are generally used to protect the toecaps of the boots rather than to protect the user's toes.

[0025] One feature of the top cap described above is the fact that the trailing edge of the applicant's toecap preferably extends substantially parallel to the line of flexure of an intended user's foot. For this to be the case, the cap should be asymmetric when viewed from above and the point on the trailing edge which is nearest the toe access needs to be offset from the leading point.

axis characterised in that a substantial portion of the trailing edge extends rearward of the trailing axis and is inclined thereto.

- 5 2. A cap as claimed in claim 1 wherein the angle of inclination between the trailing edge and the trailing axis is initially in the range of 4° to 10°.
- 10 3. A cap as claimed in claims 1 or claim 2 wherein the angle of inclination increases remote from the point.
- 15 4. A cap as claimed in any one of claims 1 to 4 wherein the trailing edge extends substantially parallel to the line of flexure of an intended user's foot.
- 20 5. A cap as claimed in any one of the preceding claims wherein the outer wall of the cap extends to point adjacent the little toe position of the intended user's foot.
- 25 6. A cap as claimed in any one of the preceding claims wherein both the inner and the outer walls extend beyond the point.
- 30 7. A cap as claimed in any one of the preceding claims wherein the trailing edge is raked rearwardly as it extends along the wall portions of the toe cap.
- 35 8. A toe cap having a trailing edge contained to correspond substantially with the natural line of flexure of a human foot.
- 40 9. A toe cap having an outwall portion which is rearwardly of its inner wall portion.
- 45 10. A toe cap as claimed in any one of the preceding claims made of steel.
- 50 11. An article of footwear incorporating a toe cap as claimed in any one of the preceding claims as an inner toecap.

Claims

1. A safety or protective toe cap having a leading point lying on a transverse toe axis, a trailing edge through which a trailing axis passes along a line extending parallel to the toe axis and through the point on the trailing edge which is nearest the toe

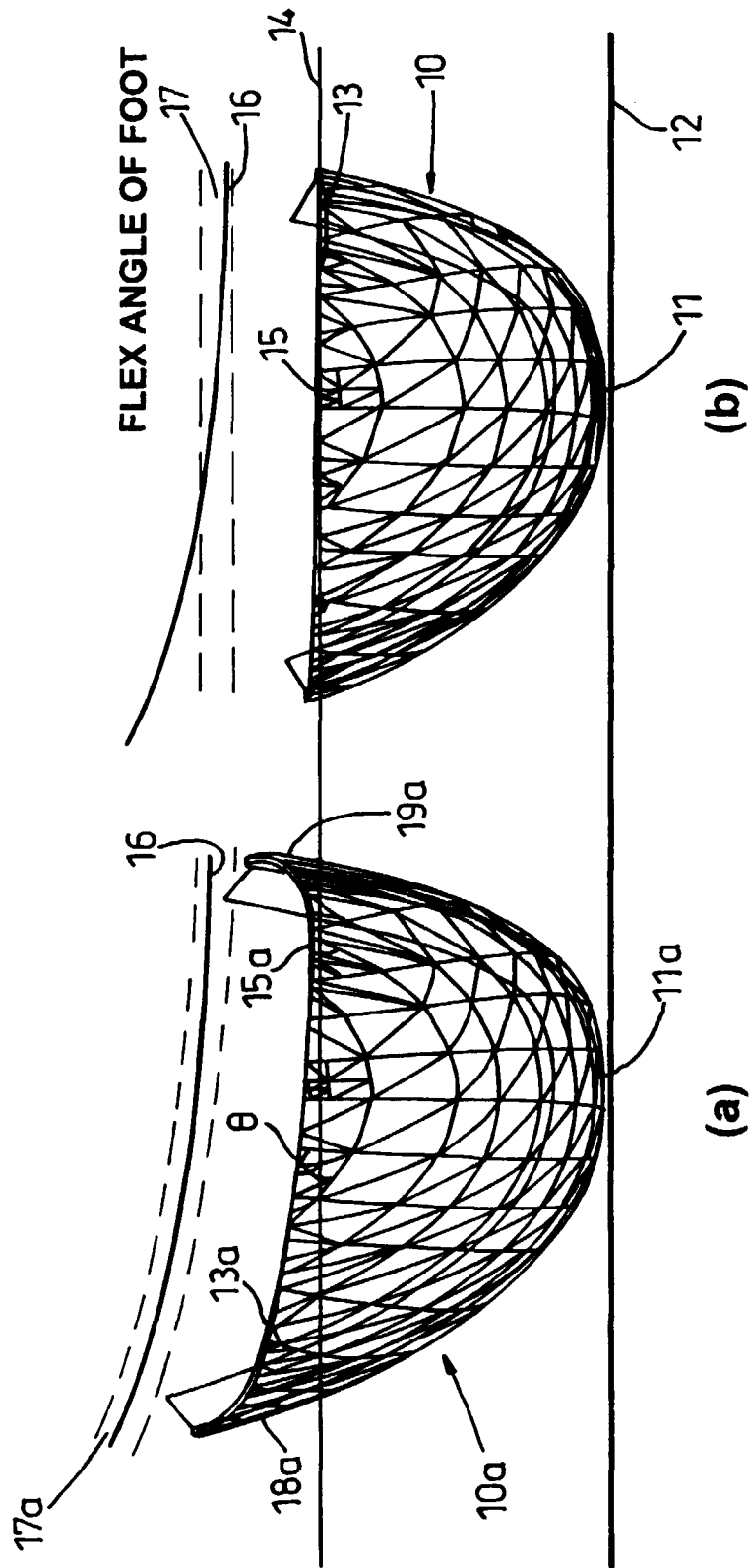
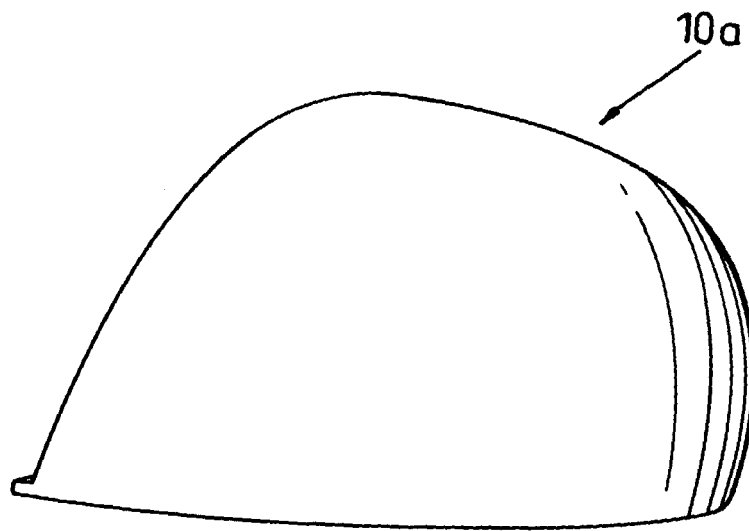
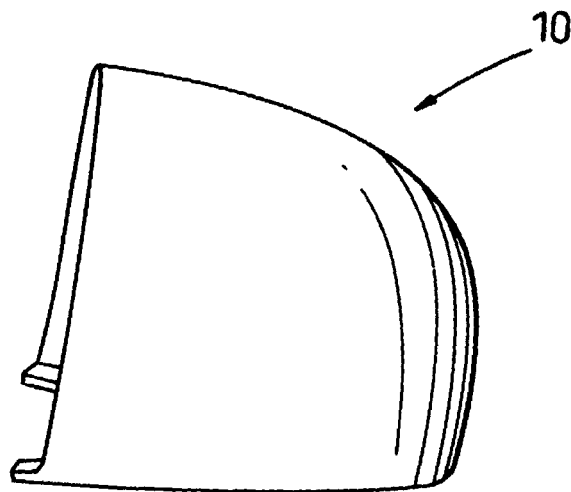


Fig. 1

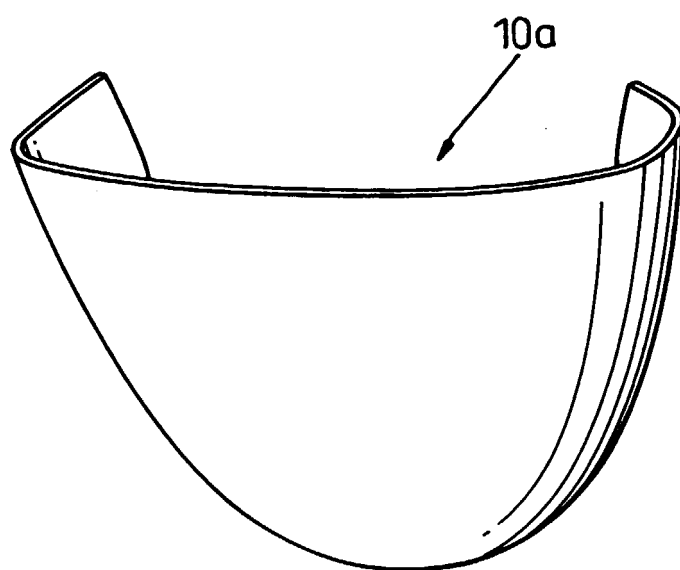


(a)

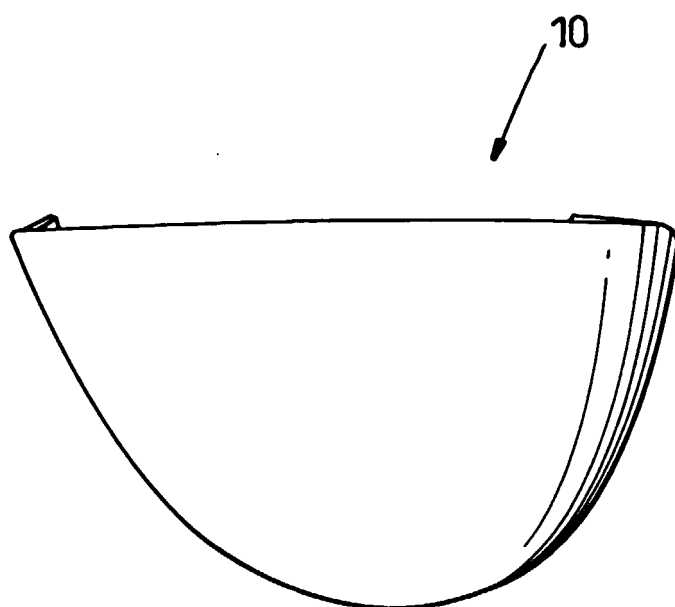


(b)

Fig. 2

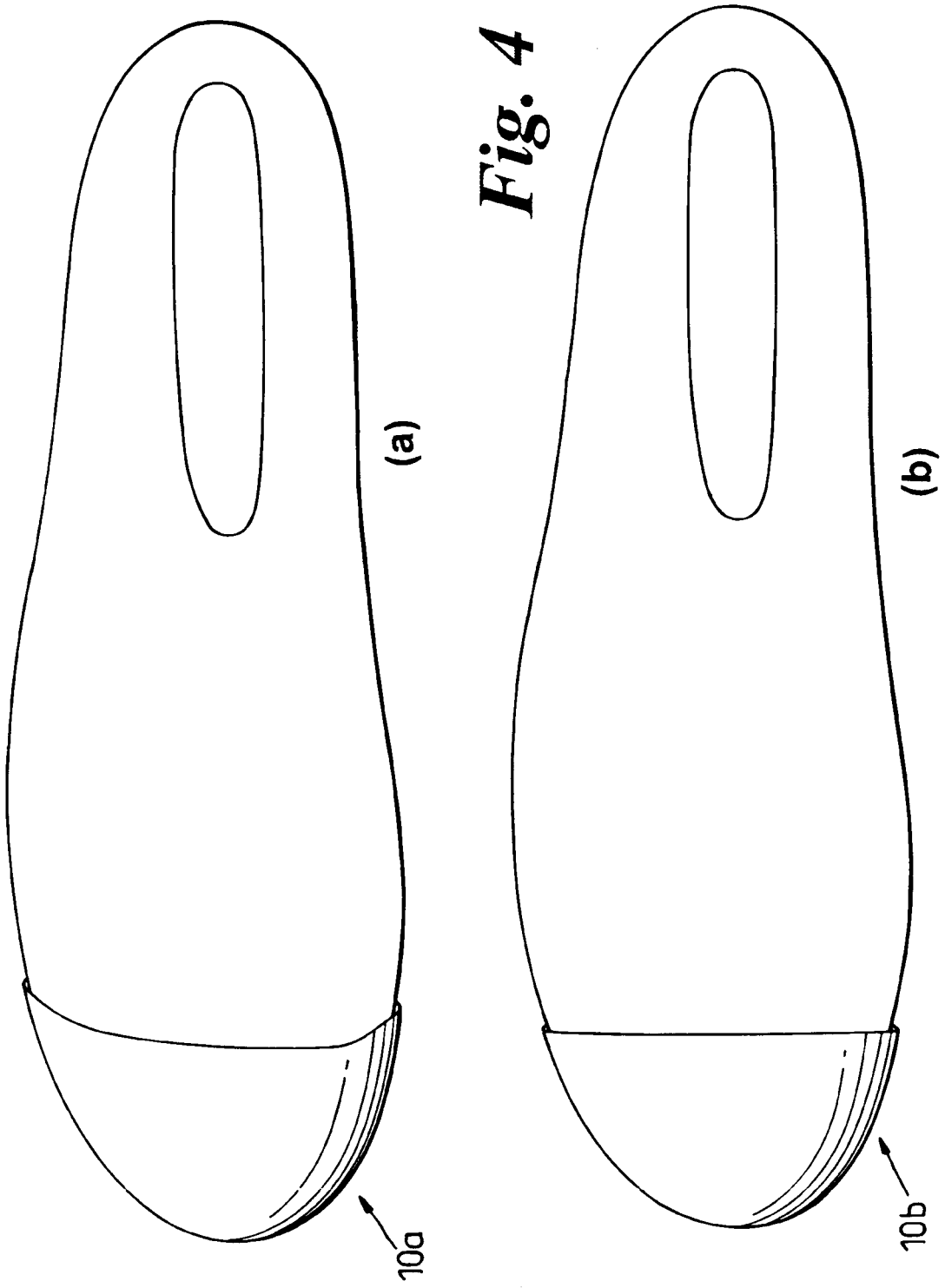


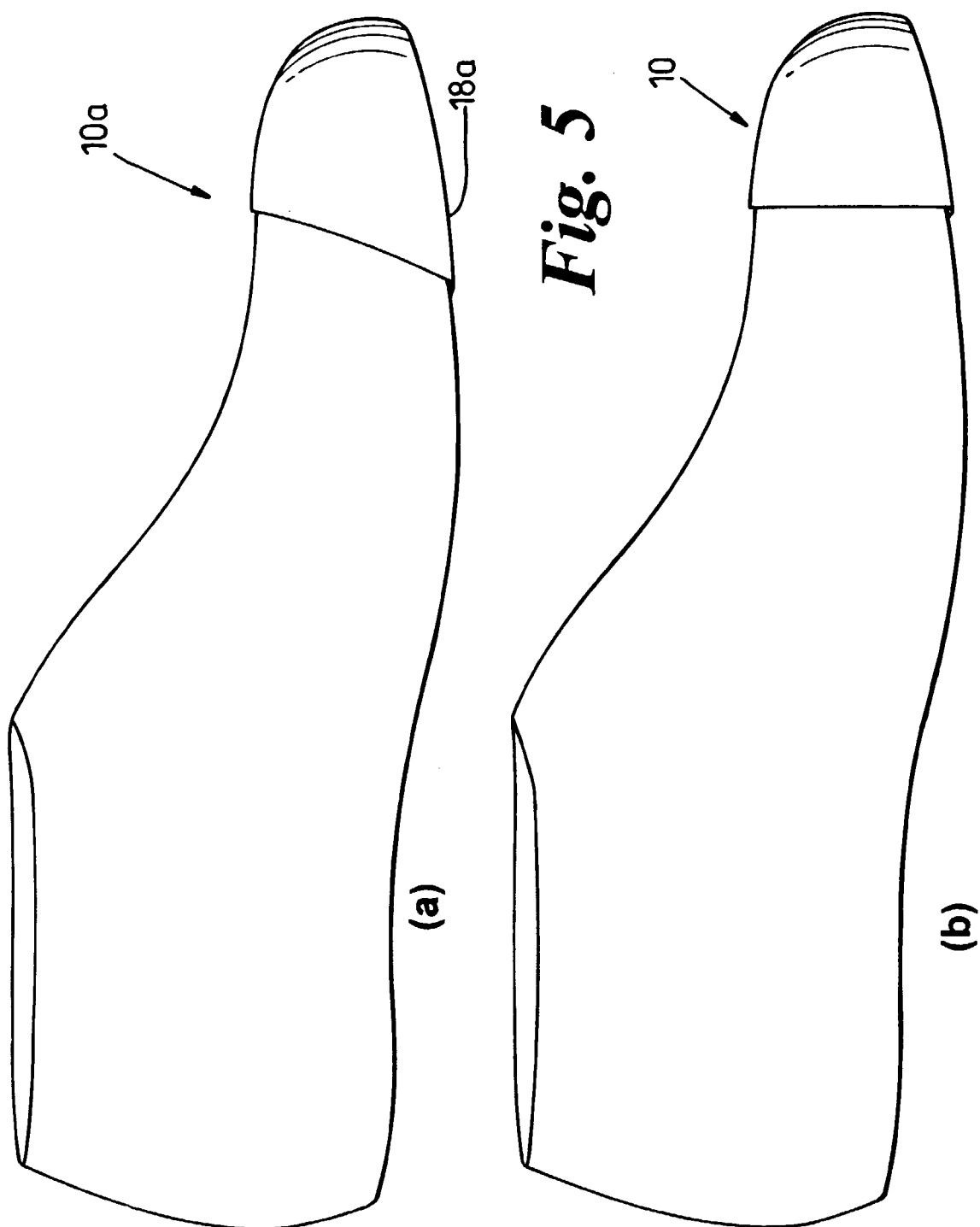
(a)



(b)

Fig. 3





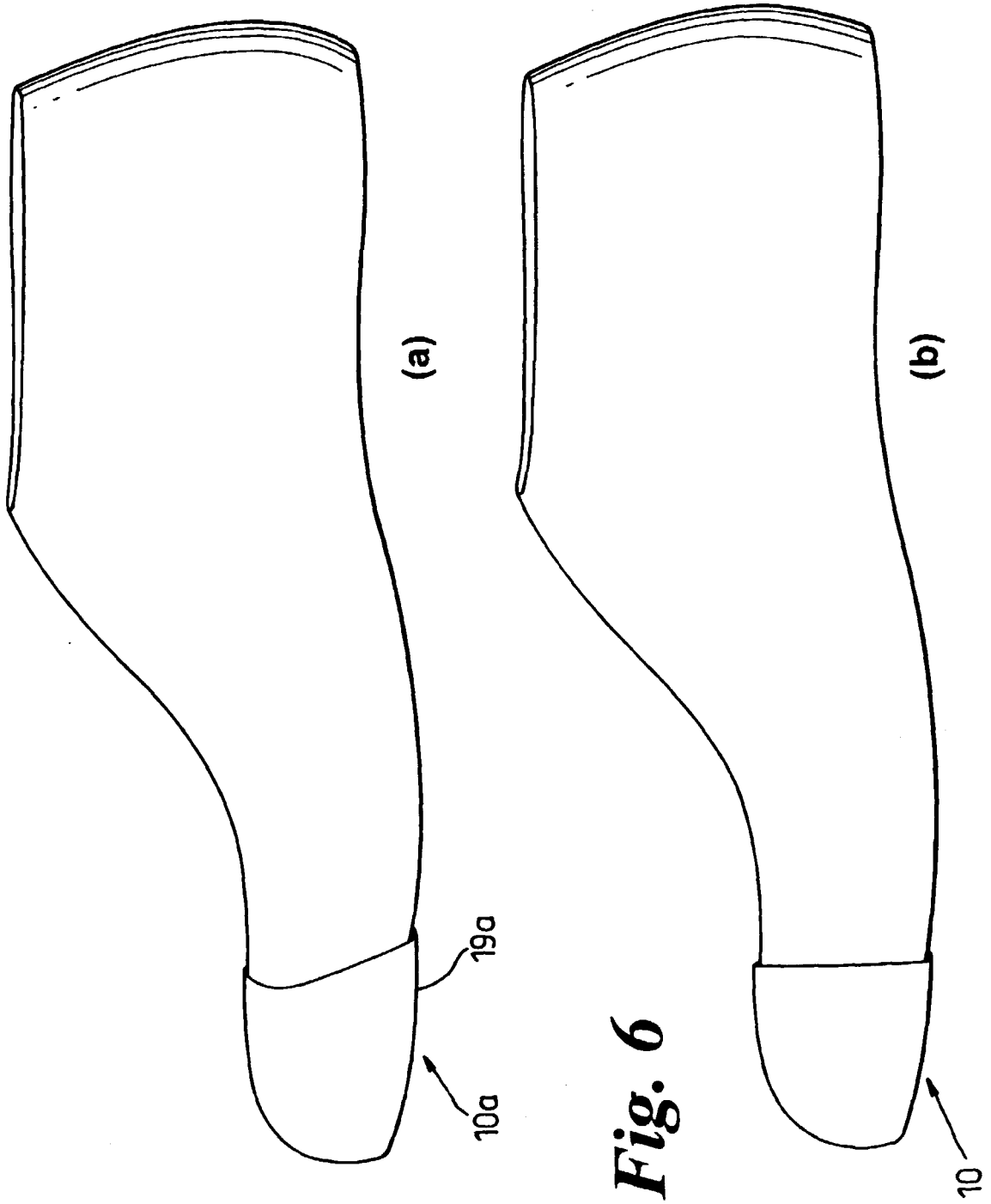


Fig. 6



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EUROPEAN SEARCH REPORT

Application Number
EP 00 30 1096

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 2 457 664 A (RAYMOND B HARRISON) 28 December 1948 (1948-12-28) * column 3, line 67 - column 4, line 14 * * figures *	1,3-11	A43B7/32 A43B23/10
X	US 4 562 652 A (HENSLE ADOLF) 7 January 1986 (1986-01-07) * column 2, line 32 - line 40 * * figures *	1,3-11	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A43B
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 15 May 2000	Examiner 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
ON EUROPEAN PATENT APPLICATION NO.**

EP 00 30 1096

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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15-05-2000

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