

(19)



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(11)

EP 0 842 619 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
20.05.1998 Bulletin 1998/21

(51) Int. Cl.⁶: **A43B 5/04**

(21) Application number: **97201774.3**

(22) Date of filing: **12.06.1997**

(84) Designated Contracting States:
**AT BE CH DE DK ES FI FR GB GR IE IT LI LU MC
NL PT SE**

(30) Priority: **16.10.1996 IT PD960252**

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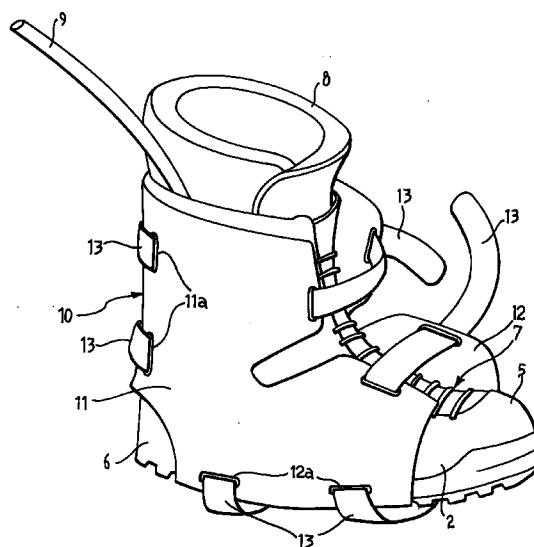
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(54) **A method of manufacturing sports footwear with a soft, yielding upper, such as a snow-board shoe or the like, and footwear produced by the method**

(57) In order to manufacture sports footwear (1) with a soft, yielding upper (1) an inner boot (8), in which a chamber for the injection of an expandable resin is defined, is provided inside the upper (2), the footwear (1) is fitted on the foot, and a containment structure (10), independent of the upper (2) and of the inner boot (8), is applied to the footwear in order to limit the deformation of the footwear (1) owing to the expansion pressures of the resin, a resin is injected into the inner boot (8) in the fluid state and, after the resin has expanded and at least partially set, the containment structure (10) is removed from the footwear (1).

FIG. 3



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Description

The present invention relates to a method of manufacturing sports footwear with a soft, yielding upper and to footwear produced by the method, according to the preambles to Claims 1 and 5, respectively.

More particularly, the invention relates to sports footwear and to a method for its manufacture, in which the inner boot is formed (substantially like a cast) directly on the user's foot at the time when the footwear is purchased or when it is first used.

It is well known that the use of footwear in which the inner boot is formed directly on the user's foot so as to fit its structure and shape as accurately as possible offers substantial advantages both with regard to comfort and convenience of use and with regard to sports performance.

Amongst the various techniques established for achieving this object, the one most suitable for producing inner boots personalized or formed directly on the user's foot is that which provides for the injection of a resin (generally a polyurethane) which can expand inside an injection chamber defined in the inner boot and which can subsequently set.

This technique is particularly effective in the production of sports footwear with a rigid outer shell which is capable, as such, of withstanding the pressures exerted by the expansion of the resin injected. It cannot be used as effectively, however, for forming inner boots in footwear with soft, yielding uppers since, because these cannot withstand the forces due to the expansion of the injected material, they would deform in a wholly unacceptable manner.

In the specific field of footwear with soft, yielding uppers, it is known to produce the inner boots by sheet forming, by thermoforming, or by injection moulding.

However, as far as the personalization of the inner boots is concerned, these techniques lead to results qualitatively inferior to those achieved by the technique of direct injection into the inner boot which is inserted in the footwear and fitted on the user's foot.

The problem upon which the present invention is based, is therefore that of providing a method which enables the aforementioned technique of the injection of expandable resin to be used in the production of an inner boot inside sports footwear with a soft upper.

This problem is solved, according to the invention, by a method and footwear produced by the method according to the following claims.

The characteristics and advantages of the present invention will become clearer from the description of an embodiment of the method according to the invention given below with reference to the appended drawings, provided by way of non-limiting example, in which:

- Figure 1 shows, in perspective and with the parts separated, sports footwear with a soft upper at a stage in the application of the method according to

the present invention,

- Figure 2 is a partially-sectioned, perspective view of the sports footwear of Figure 1, during a second stage in the application of the method of the invention,
- Figure 3 is a perspective view of sports footwear with a soft upper in a variant of the method of the invention.

With reference to the drawings, sports footwear substantially in the form of an ankle boot and having a soft upper 2, for example, footwear of the type generally used for snow-boarding, is indicated 1. In this context, the term "footwear with a soft upper" is intended to indicate footwear with an upper or parts thereof having a composition which is particularly deformable and yielding or which, in any case, does not have the characteristics of stiffness which are typical of the compositions of the outer shells of ski boots.

In particular, the soft, and hence deformable, parts of the footwear 2 are constituted by the side portions 3, 33 thereof, and by the leg portion 4, the toe portion 5 and the heel portion 6 themselves being sufficiently rigid.

The footwear also comprises conventional fastening means with laces, generally indicated 7.

A double-walled inner boot, indicated 8, is made of a suitable, known, strong and deformable plastics material.

An injection chamber, not visible in the drawings, is defined between the walls of the inner boot 8 and is substantially impermeable to resin which can be injected into the chamber through a tube 9 which leads to the chamber from outside the footwear when the inner boot 8 is housed therein.

A containment structure of the upper 2, separate and structurally independent of the upper 2 and of the inner boot 8, is generally indicated 10. In the embodiment shown by way of example, the structure 10 comprises two stiff walls 11, 12, designed and shaped so as substantially to match the respective soft portions 3, 33 of the upper 2.

The walls 11, 12 have peripheral, elongate, slot-like holes 11a, 12a forming through-holes for strap-like fastenings, all indicated 13.

According to a first embodiment of the method of the invention (Figures 1 and 2) the inner boot 8 is first fitted on the user's foot and the containment structure 10 is fitted onto it and is tightened by means of the fastenings 13. The next step of the method consists in inserting the inner boot 8, with the respective structure 10, in the upper 2 so that the walls 11, 12 of the containment structure are disposed beside the respective soft (or deformable) portions of the upper 2, particularly the side portions 3, 33, and the leg portion 4 of the upper, and in lacing the footwear tightly onto the foot with the desired tension, with the fastening means 7.

At this point, an expandable plastics material, for

example, preferably a two-part polyurethane resin, is injected, in the fluid state, into the injection chamber of the inner boot 8. During the injection step, the forces generated by the expansion of the material selected are effectively withstood by the rigid containment structure 10. A limited stress consequently reaches the soft portions of the upper 2, which therefore undergoes only partial and acceptable deformation.

Upon completion of the expansion and setting, that is, when the inner boot is formed substantially as a cast on the user's foot, the footwear 1 is first unfastened and the fastenings 13, 13 are then slackened so as to allow the footwear to be removed from the user's foot with the respective inner boot 8 fitted thereon. At this point, the structure 10 is removed and the injected inner boot is fitted back in the footwear thus made available.

Variations and modifications, all falling within the scope of the inventive concept, may be applied to the invention. Thus, for example, Figure 3 shows a variant of the method described above in accordance with which the containment structure 10, again comprising a pair of walls 11, 12 and respective strap-like fastenings 13 for connecting them to one another, is fitted and closed externally onto the upper 2 of the footwear 1 into which the user's foot, already provided with the inner boot 8, has previously been fitted, and which has been tightened in the desired manner by the fastening means 7.

In this case, the stresses which the expanding resin injected into the injection chamber of the inner boot 8 exerts on the soft portions of the upper 2 during the injection step are also fully absorbed by the containment structure 10 without any consequent deformation of the soft portions.

Claims

1. A method of manufacturing sports footwear (1) with a soft, yielding upper (2), comprising the steps of:
 - providing an inner boot (8) in the upper (2), a chamber for the injection of an expandable resin being defined in the inner boot (8),
 - fitting the footwear (1) on the user's foot,
 - injecting the resin into the chamber,
 - causing the resin to set, characterized in that it comprises the further steps of:
 - providing a containment structure (10) separate and structurally independent of the upper (2) and of the inner boot (8),
 - applying the structure (10) to the footwear (1) before the resin is injected, in order to limit the deformation of the footwear (1) owing to the expansion pressure of the resin,
 - removing the containment structure (10) from the footwear (1) after the resin has at least partially set.

2. A method according to Claim 1, in which the containment structure (10) is fitted inside the footwear (1), between the inner boot (8) and the upper (2).
3. A method according to Claim 1, in which the containment structure (10) is fitted onto the footwear (1), outside the upper (2).
4. A method according to any one of the preceding claims, in which the structure (10) comprises rigid walls (11, 12) which are placed beside corresponding soft portions (3, 33) of the upper (2) and are associated with one another in order to contain the forces exerted by the expansion of the resin during injection into the inner boot (8).
5. Sports footwear with a soft, yielding upper (2) produced in accordance with the method of Claim 1, comprising an inner boot (8) fitted in the upper (2), a chamber being defined in the inner boot (8) for the injection, in the fluid state, of a resin which can expand and subsequently set, characterized in that a containment structure (10) separate and structurally independent of the upper (1) and of the inner boot (8) is provided for application to the footwear (1) before the resin is injected so as to limit the deformation of the footwear owing to the expansion pressures of the resin.
6. Footwear according to Claim 5, in which the structure (10) comprises at least two rigid walls (11, 12) which are disposed beside soft portions (3, 33) of the upper (2), and a plurality of fastenings (13) for connecting the walls to one another in order to contain the forces exerted by the expansion of the resin during the injection of the resin into the inner boot (8).
7. Footwear according to Claim 5 or Claim 6, in which the rigid walls (11, 12) are fitted in the footwear (1) in a position between the upper (2) and the inner boot (8).
8. Footwear according to Claim 5 or Claim 6, in which the walls (11, 12) are fitted outside the upper (2).
9. Footwear according to one or more of Claims 5 to 8, in which the sizes and shapes of the walls (11, 12) match those of respective soft portions (3, 33) of the upper.

FIG. 1

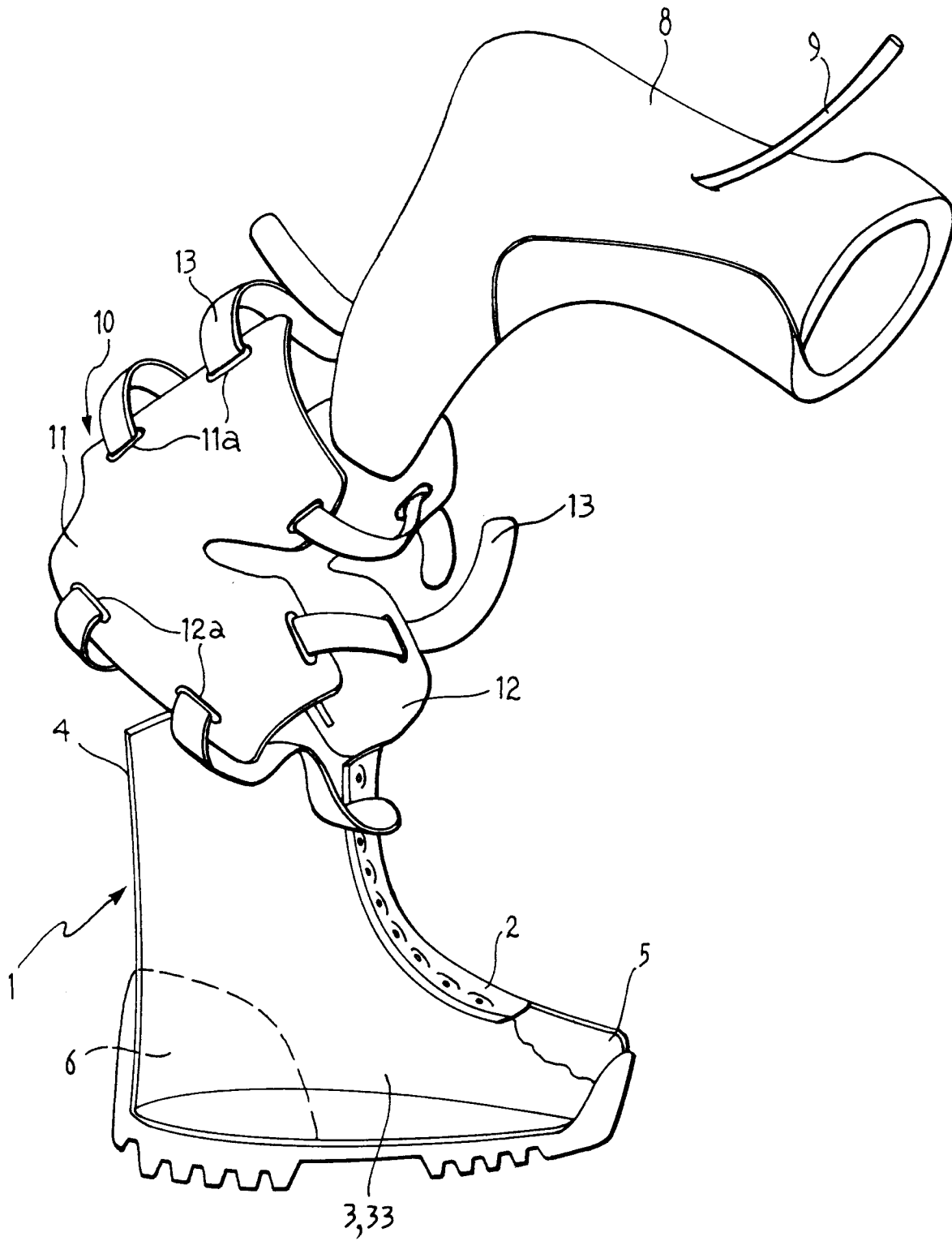


FIG. 2

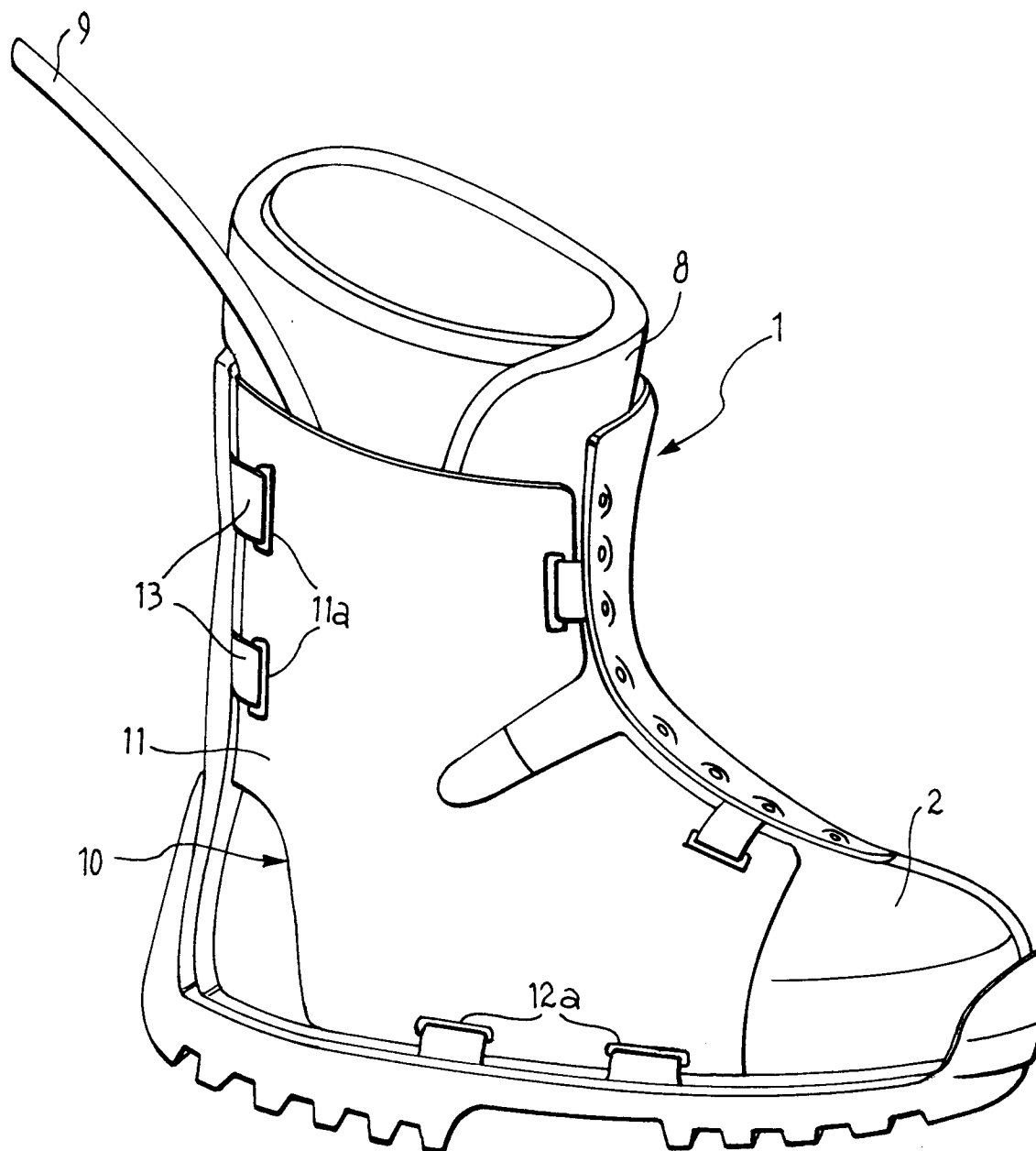


FIG. 3

