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(54) **Ski boot**

(57) A ski boot (1) provided with a rigid shell (2), which is shaped so as to receive the foot of the skier and is provided with a first rigid portion (2a) and a second rigid portion (2b) that are joined to one another by an elastically deformable portion (7), which extends substantially astride of the metatarsal area of the foot, the ski boot (1) further comprising means for locking the shell (9), which are able to connect the first rigid portion (2a) and the second rigid portion (2b) of the shell (2) rigidly to one another so as to prevent compression of the elastically deformable portion (7); the means for locking the shell (9) comprise a rigid transversal arm (10), which extends astride of the elastically deformable portion (7) of the shell (2), has its proximal end hinged on the first rigid portion (2a) of the shell (2) so as to be able to rotate freely with respect to the shell (2) about a first axis (B), and a guide pin (11), which extends in cantilever fashion from the second rigid portion (2b) of the shell (2), sharing a second axis (C) locally substantially parallel to the first axis (B), and slidably engages a longitudinal slit (10a) purposely provided in a position corresponding to the distal end of the transversal arm (10); at its distal end, the transversal arm (10) further having a through-seat (10b), which is positioned beside the longitudinal slit (10a), is shaped so as to receive the guide pin (11), and finally is connected to the longitudinal slit (10a) through a groove (10c), which is sized so as to enable passage of the guide pin (11) from the longitudinal slit (10a) to the through-seat (10b) or vice versa.

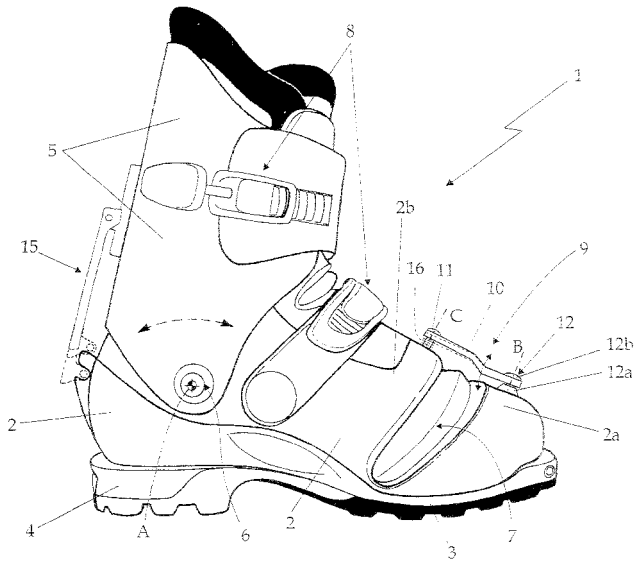


Fig. 1

EP 2 201 853 A1

Description

[0001] The present invention relates to a ski boot.

[0002] More specifically, the present invention relates to a boot for ski-mountaineering or telemark, use to which the following description refers purely by way of example without implying any loss of generality.

[0003] As is known, ski-mountaineering boots normally comprise a plastic-material rigid shell shaped so as to receive the foot of the skier, a front sole and a rear heel made of elastomeric anti-slip material, a plastic-material rigid cuff hinged to the shell at the ankle joint, and finally a number of closing buckles that are appropriately distributed on the shell and on the cuff and are structured so as to be able to grip tighten the shell and the cuff to immobilize the leg of the skier within the ski boot.

[0004] In the practice of ski-mountaineering and telemark it is moreover indispensable to be able to raise, in given circumstances, the heel of the ski boot from the underlying ski, always keeping the tip of the ski boot firmly anchored to the ski, thus ski-mountaineering boots are structured so that the shell that is to receive the foot of the skier is provided with an elastically deformable portion, which extends astride of the metatarsal area of the foot so to enable the front part of the shell to deform elastically in order to assume temporarily a slightly curved shape that enables a slight bending of the sole of the foot of the skier.

[0005] More specifically, the shell of ski-mountaineering boots is usually provided with a bellows-like pleating with programmed deformation, which extends astride of the metatarsal area of the foot so as to enable the toe of the shell to bend by some degrees with respect to the remaining part of the shell.

[0006] Albeit having met for decades with a big success among all those who practise ski-mountaineering and telemark, ski-mountaineering boots with the bellows-like pleating on the front part of the shell have proven far from suitable is used in combination with the new ski-boot locking systems with two fixing points, which are designed to fix the ski boot on the ski-mountaineering or telemark ski via to locking menbers, which are aligned along the longitudinal axis of the ski, and are structured so as to grip and rigidly lock the part of the ski-boot sole beneath the metatarsus onto a tippable supporting plate which is hinged in a flap-like way on the ski, immediately beneath the tip of the ski boot.

[0007] The grip exerted by the jaws of the locking members subjects, in fact, the sole of the ski-mountaineering or telemark boot to a force of compression that acts tangentially to the sole laying plane and tends to arch the body of the sole upwards, with all the drawbacks that this entails. Obviously, said arching can be avoided by adopting a shell with high flexural stiffness that will counter any elastic deformation of the sole.

[0008] Unfortunately, ski-mountaineering or telemark boots with the bellows-like pleating on the front part of the shell go in the opposite direction, giving upon the structure formed by the shell and by the sole fixed to the latter a structural stiffness degree which is insufficient for guaranteeing proper operation of the new ski-boot locking systems with two fixing points on the front part of the sole beneath the metatarsus.

[0009] To overcome this drawback, various mechanical systems have been developed, which are selectively capable of preventing deformation of the bellows-like pleating of the shell. Some of these mechanical systems are described in the European patent applications EP-1913828 and EP-0664969, in the U.S. patent application US2002174570, and in the PCT application WO-9501740.

[0010] Unfortunately, the mechanical locking systems so far developed have proven far from practical to use and in some cases also potentially dangerous because they are subject to accidental opening when the tip of the ski boot equipped with crampons is thrust forcefully into a wall of particularly hard and compact snow during climbs or particularly difficult passages without skis.

[0011] Aim of the present invention is therefore to provide a ski-mountaineering or telemark boot equipped with a mechanical system for blocking the bellows-like pleating of the shell, which is free from the drawbacks described above and si moreover cheap to produce.

[0012] In compliance with the above aim, according to the present invention there is provided a ski boot as defined in Claim 1 and preferably, though not necessarily, in any one of the dependent claims.

[0013] A non-limiting embodiment of the present invention will now be described by way of example with reference to the accompanying drawings, in which:

- Figure 1 is a side view of a ski-mountaineering boot realized in accordance with the teachings of the present invention; whereas
- Figures 2 and 3 show in perspective view the front partion of the ski-mountaineering boot shown in Figure 1, in two different operating configurations.

[0014] With reference to Figure 1, number 1 designates as a whole a ski boot, and in particular a ski boot specifically realized for practising in safety conditions the sports activities of ski-mountaineering or telemark.

[0015] Ski boot 1 basically comprises: a plastic-material rigid shell 2 which is shaped so as to accomodate the foot of the skier; a front sole 3 and a rear heel 4 which are made of anti-slip elastomeric material and are fixed in a known manner on the underpart of the shell 2; and a plastic-material rigid cuff 5 which is shaped so as to receive the ankle of the skier and is hinged to the shell 2 at the ankle joint.

[0016] More specifically, cuff 5 is fixed in a freely rotatable manner on the two side walls of shell 2 via two connecting hinges 6 aligned along the ankle articulation transversal axis A which, in turn, is substantially perpendicular to the vertical central plane M of the ski boot (parallel to the plane of the page in Figure 1); whreas shell 2

is provided with an elastically deformable portion 7 which extends astride of the metatarsal area of the foot so as to enable the front part of the shell 2 to deform elastically in order to assume temporarily a slightly curved shape such as to enable a slight bending of the sole of the foot of the skier.

[0017] More specifically, the elastically deformable portion 7 of the shell 2 extends from one side to the other of shell 2, astride of the metatarsal area of the foot, almost up to the sole 3, so as to separate and join to one another the toe portion 2a and the median portion 2b of the shell 2, which are both substantially rigid and undeformable.

[0018] In particular, in the example shown, the elastically deformable portion 7 of the shell 2 is constituted by a bellows-like pleating 7 with programmed deformation, which extends from one side to the other of shell 2, substantially astride of the metatarsal area of the foot, almost up to the sole 3 so as to enable the toe portion 2a of the shell 2 to incline by some degrees with respect to the median portion 2b of the shell 2.

[0019] In addition to the above, in the example shown, the bellows-like pleating 7, i.e. the elastically deformable portion 7 of shell 2, extends from one side to the other of shell 2 following a slightly oblique arched path, so that the end on the internal side wall of shell 2 is positioned ahead of the end located on the external side wall of shell 2 to follow the natural bending axis of the foot.

[0020] With reference to Figures 1 and 2, ski boot 1 is moreover provided with a number of closing buckles 8 which are appropriately distributed on shell 2 and on cuff 5, and are structured so as to be able to tighten the shell 2 and the cuff 5 so as to immobilize the leg of the skier within the ski boot 1; and with a shell locking member 9 which, if needed, is able to rigidly connect the toe portion 2a of shell 2 to the median portion 2b of the same shell 2, so as to prevent any relative movement between the various parts of the shell 2, thus malking the shell 2 and the sole 3 fixed to the latter a substantially undeformable rigid body.

[0021] Closing buckles 8 are devices widely known in the field, and therefore will not be described any further.

[0022] With reference to Figures 1, 2 and 3, locking member 9 extends astride of the elastically deformable portion 7 of the shell 2, i.e. of the bellows-like pleating 7, and comprises:

- a rigid transversal arm 10, which is preferably, though not necessarily, made of metal material and extends astride of the elastically deformable portion 7 of shell 2, remaining preferably, though not necessarily, coplanar or in any case substantially parallel to the vertical central plane M of the ski boot 1 (parallel to the plane of the page in Figure 1), and has its proximal end hinged on the top of the toe portion 2a of shell 2 so as to be able to rotate freely with respect to shell 2 about a rotation axis B which is locally substantially coplanar, or in any case substantially parallel, to the vertical central plane M of shell 2 and locally substantially perpendicular to the surface of shell 2 and to the longitudinal axis of the arm itself; and
- a guide pin 11 which juts out from the median portion 2b of shell 2, remiaing coaxial to an axis C which is locally substantially parallel to axis B, and slidably engages a longitudinal slit 10a specifically realized at the distal end of transversal arm 10.

[0023] More specifically, guide pin 11 is substantially mushroom-shaped, whereas longitudinal slit 10a extends substantially parallel to the arm longitudinal axis and to the vertical central plane M of the shell 2, and has a flared shape so as to receive, and be slidably engaged by, both the stem and the head of guide pin 11.

[0024] With reference to Figures 1, 2 and 3, in the example shown, in particular, the distal end of transversal arm 10 has preferably, though not necessarily, a flattened shape and extends above shell 2, remaining locally substantially tangential to, and at a distance from, the surface of the same shell 2.

[0025] More specifically, in the example shown, transversal arm 10 consists of an oblong plate 10 made of metal material or a composite material such as carbon fibre.

[0026] With reference to Figures 2 and 3, at its own distal end, transversal arm 10 moreover has a flared through-seat 10b which is located at the side of the longitudinal slit 10a, is shaped and dimensioned so as to receive both the stem and the head of guide pin 11, and is finally connected to the longitudinal slit 10a through a groove or restriction 10c which is dimensioned so as to only allow the passage of the stem of guide pin 11.

[0027] In this way, guide pin 11 can pass from the through-seat 10b to the longitudinal slit 10a only if the distal end of transversal arm 10 is displaced parallel to axis C and towards the surface of shell 2, so as to bring the head of guide pin 11 completely out of the longitudinal slit 10a or of the through-seat 10b.

[0028] To enable the distal end of transversal arm 10 to approach the surface of shell 2, the proximal end of transversal arm 10 must be fixed on the top of toe portion 2a of shell 2 by means of a support pin 12, which will also enable an albeit limited traversing movement of transversal arm 10 in a plane coinciding, or in any case substantially parallel, to the axis C of guide pin 11, and hence to the vertical central plane M of shell 2 (parallel to the plane of the page in Figure 1).

[0029] In particular, in the example shown the proximal end of transversal arm 10 rests on the top of a spacer bushing 12a which protrudes from the surface of shell 2 coaxial to axis B, and has preferably, thought not necessarily, a truncated cone shape diverging towards the shell 2; and is hinged to the shell 2 by means of a through screw 12b with flared or flat head, the stem of which extends coaxial to axis B, extends in through manner both the transversal arm 10 and the underlying spacer bushing 12a, and finally is screwed directly into the body of the

shell 2.

[0030] The support pin 12 formed by the spacer bushing 12a and by the through screw 12b is structured so as to enable transversal arm 10 to rotate only about axis B, and so as to keep the distal end of transversal arm 10 in abutment on the head of guide pin 11, and hence the head of guide pin 11 always trapped within the longitudinal slit 10a or else within the through-seat 10b. Whereas the thickness of the shell 2 around the point in which the stem of through screw 12b penetrates into the body of shell 2, and the elastic modulus of the plastic material of which the shell 2 is made are chosen so as to enable the user to elastically deform the shell 2 in order to incline the support pin 12 temporarily by some tenths of a degree towards the guide pin 11.

[0031] The inclination of support pin 12 towards guide pin 11 results in a displacement of the distal end of transversal arm 10 towards the surface of shell 2, with consequent complete exit of the head of guide pin 11 from the longitudinal slit 10a or else from the through-seat 10b previously engaged.

[0032] Preferably, though not necessarily, ski boot 1 is finally provided with a cuff locking device 15 which, as desired and alternatively, is able to: lock the cuff 5 rigidly to the shell 2 so as to prevent any relative movement between the two elements; connect the cuff 5 to the shell 2 so as to enable only positive oscillations of the cuff 5 about axis A, which, starting from a pre-set resting position, move the cuff 5 closer to the toe portion 2a of shell 2; or else release the cuff 5 from the shell 2 so as to permit the cuff 5 to freely oscillate about axis A both forwards and backwards.

[0033] Operation of ski boot 1 is easily inferreable from the above description, and hence no further explanations are required.

[0034] As regards instead operation of the locking member 9, when the head and the stem of guide pin 11 engage the through-seat 10b on the distal end of transversal arm 10 (see Figure 3), the guide pin 11 does not have any possibility of displacing within the distal end of the transversal arm 10; hence, transversal arm 10 rigidly connects the toe portion 2a of shell 2 to the median portion 2b of the same shell 2, preventing any deformation of the elastically deformable portion 7 of shell 2.

[0035] In other words, when the head and the stem of guide pin 11 engage the through-seat 10b on the distal end of transversal arm 10, the transversal arm 10 prevents any bending of the toe portion 2a of shell 2 with respect to the median portion 2b of the same shell 2.

[0036] Conversely, when the head and the stem of guide pin 11 engage the longitudinal slit 10a on the distal end of transversal arm 10 (see Figure 2), the guide pin 11 can slide freely along the distal end of transversal arm 10, eliminating the mechanical constraints between the toe portion 2a and the median portion 2b of shell 2. In other words, when the head and the stem of guide pin 11 engage the longitudinal slit 10a on the distal end of transversal arm 10, the transversal arm 10 slides on the guide pin 11 enabling deformation of the elastically deformable portion 7 of shell 2, and hence bending of the toe portion 2a of shell 2 with respect to the median portion 2b of the same shell 2.

[0037] To displace the shell locking member 9 from one operating configuration to the other, the user must forcefully press directly on the distal end of transversal arm 10 so as to push said distal end towards the surface of shell 2, causing exit of the head of guide pin 11 from the longitudinal slit 10a (or else from the through-seat 10b), and then he must rotate the transversal arm 10 by some degrees about the axis B so as to force the stem of guide pin 11 to pass through the connection groove or restriction 10c and reach the through-seat 10b (or else the longitudinal slit 10a).

[0038] Once passage of the guide pin 11 from the through-seat 10b to the longitudinal slit 10a or vice versa is completed, the user stops pressing on the distal end of the transversal arm 10, so to allow the latter to return into its original position in which it once again traps the head of guide pin 11 inside the through-seat 10b or the longitudinal slit 10a.

[0039] The particular shape of the groove or restriction 10c provided on the distal end of transversal arm 10 then prevents passage of the guide pin 11 from the through-seat 10b to the longitudinal slit 10a or vice versa, when the head of guide pin 11 engages the through-seat 10b or the longitudinal slit 10a.

[0040] The advantages afforded by the ski boot 1 are large in mumber. Firstofall, shell locking member 9 is extremely easy to use, even when the user is in difficult environmental conditions, and is not subject to accidental release.

[0041] Furthermore, locking member 9 is lend to be mounted also on ski-mountaineering or telemark boots that are already commercially available, without any particular counterindications.

[0042] Clearly changes may be made to the ski boot 1 for telemark or ski-mountaineering as described herein without, however, departing from the scope of the present invention.

[0043] For exaple, in a different embodiment of the locking member 9, the proximal end of transversal arm 10 could be connected to the support pin 12 by means of a spherical joint or the like, which will enable the transversal arm 10 to rotate about axis B and freely traverse on a plane containing or in any case parallel to axes B and C.

[0044] In this case, the locking member 9 could be provided with an elastic element 16 capable of keeping the distal end of the transversal arm 10 in abutment on the head of guide pin 11, such as for example a pre-compressed coil spring 16 (see the dashed line in Figure 1) fitted on the stem of guide pin 11 with a first end resting on the shell 2 and a second end resting on the transversal arm 10.

[0045] Again, in a non-shown variantion combinable with any one of the embodiments described above, the

shell locking member 9 could also comprise a safety spacer element that the user can interpose between the shell 2 and the distal end of transversal arm 10 so as to prevent any undesirable displacement of the distal end of transversal arm 10 along the stem of guide pin 11, in removal from the position in which the distal end receives and traps the head of guide pin 11.

[0046] Said spacer element may cosist, for example, in a substantially C-shaped rubber plug, which is sized to be force-fitted, but in an easily removable manner, on the stem of guide pin 11, between the shell 2 and the distal end of transversal arm 10, so as to prevent any displacement of the distal end of transversal arm 10 parallel to axis C of guide pin 11 towards the surface of the immediately underlying shell 2.

Claims

1. A ski boot (1) comprising a rigid shell (2) which is shaped so as to accommodate the foot of the skier and is provided with a first (2a) and a second rigid portion (2b) joined to one another by an elastically deformable portion (7) extending substantially astride the metatarsal area of the foot; the ski boot (1) further comprising shell locking means (9) which are selectively adapted to rigidly and reciprocally connect said first (2a) and said second rigid portion (2b) of the shell (2), so as to prevent the compression of said elastically deformable portion (7); the ski boot (1) being **characterised in that** said shell locking means (9) comprise:

   - a rigid transversal arm (10) which extends astride the elastically deformable portion (7) of the shell (2), has its proximal end hinged on the first rigid portion (2a) of the shell (2), so as to freely rotate with respect to the shell (2) about a first axis (B), and
   - a guide pin (11) which juts out from the second rigid portion (2b) of the shell (2), remaining coaxial to a second axis (C) locally substantially parallel to said first axis (B), and which slidingly engages a longitudinal slit (10a) specifically realized on the distal end of said transversal arm (10);

   at its distal end, the transversal arm (10) further having a through-seat (10b) which is positioned beside the longitudinal slit (10a), is shaped so as to house the guide pin (11), and finally is connected to the longitudinal slit (10a) through a groove (10c) which is dimensioned so as to allow the passage of the guide pin (11) from the longitudinal slit (10a) to the through-seat (10b) or vice versa.

2. A ski boot according to claim 1, **characterised in that** the guide pin (11) is substantially mushroom-shaped; **in that** the longitudinal slit (10a) extends substantially parallel to the longitudinal axis of the arm, and has a flared shape so as to house and be slidingly engaged both by the stem and by the head of the guide pin (11); and **in that** the through-seat (10b) is profiled so as to house both the stem and the head of the guide pin (11); and **in that** the connection groove (10c) is dimensioned so as to allow the passage only of the stem of the guide pin (11).

3. A ski boot according to claim 2, **characterised in that** the transversal arm (10) is hinged on the first rigid portion (2a) of the shell (2) so as to traverse on a plane locally substantially parallel to said second axis (C), so as to allow the distal end of the transversal arm (10) to move along the stem of the guide pin (11).

4. A ski boot according to claim 3, **characterised in that** the transversal arm (10) is hinged on the first rigid portion (2a) of the shell (2) so as to maintain the distal end of the transversal arm (10) in abutment on the head of the guide pin (11), and the head of the guide pin (11) always trapped within the longitudinal slit (10a) or within the through-seat (10b).

5. A ski boot according to claim 3 or 4, **characterised in that** the transversal arm (10) is connected to the first rigid portion (2a) of the shell (2) by means of a support pin (12) which allows only the rotation of the transversal arm (10) about the first axis (B); at the support pin (12), the shell (2) being structured so as to allow the user to elastically deform the shell (2) so as to temporarily incline the support pin (12) towards the guide pin (11), allowing the transversal arm (10) to traverse on a plane locally substantially parallel to said second axis (C).

6. A ski boot according to claim 3 or 4, **characterised in that** the transversal arm (10) is connected to the first rigid portion (2a) of the shell (2) by means of a support pin (12) which allows the transversal arm (10) to rotate about a first axis (B), and to freely traverse on a plane substantially parallel to said first (B) and second axis (C); and **in that** the shell locking means (9) also comprise an elastic element (16) which is able to maintain the distal end of the transversal arm (10) in abutment on the head of the guide pin (11).

7. A ski boot according to any of claims 2 to 6, **characterised in that** the shell locking means (9) also comprise a spacer element which is adapted to be interposed between the shell (2) and the transversal arm (10), so as to prevent the undesired displacement of the distal end of the transversal arm (10) along the stem of the guide pin (11).

8. A ski boot according to any of the preceding claims, **characterised in that** the first axis (B) is locally substantially perpendicular to the surface of the shell (2).

9. A ski boot according to claim 8, **characterised in that** said transversal arm (10) extends substantially parallel to the vertical centre plane (M) of the shell (2), and said first axis (B) is locally substantially parallel to said vertical centre plane (M).

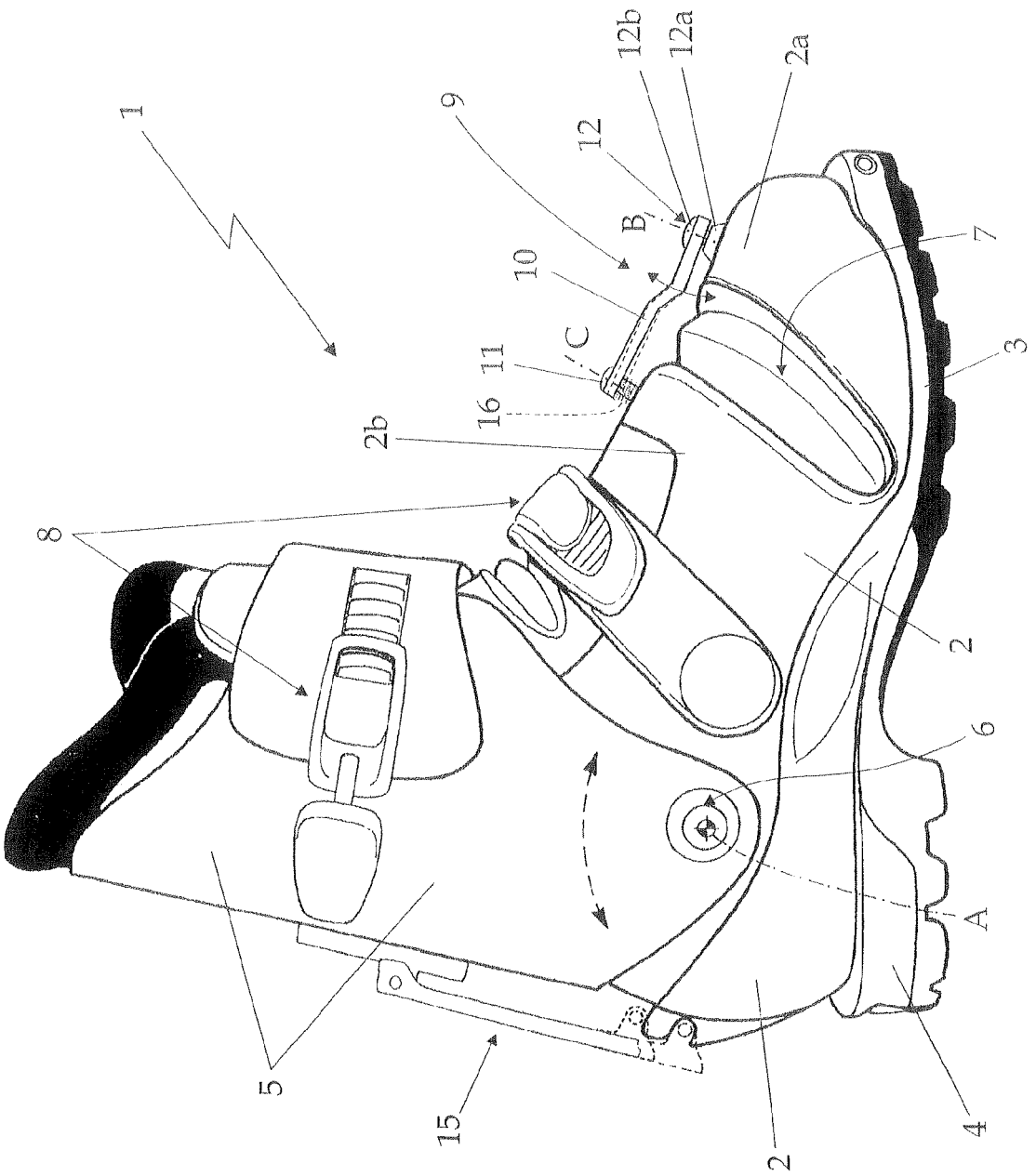
10. A ski boot according to any of the preceding claims, **characterised in that** the first rigid portion (2a) of the shell is the toe portion (2a) of said shell (2).

11. A ski boot according to any of the preceding claims, **characterised in that** said elastically deformable portion (7) of the shell (2) comprises a programmed deformation bellow-like pleating (7) extending from one side to the other of the shell (2), substantially astride the metatarsal area of the foot.

12. A ski boot according to any of the preceding claims, **characterised in that** it further comprises a rigid cuff (5) which is shaped so as to accommodate the ankle of the skier and is hinged to the shell (2) substantially at the ankle joint.

13. A ski boot according to claim 12, **characterised in that** it also comprises leg-piece locking means (15) which are selectively able to rigidly lock the cuff (5) to the shell (2) so as to prevent any relative movement between the two elements; to lock the cuff (5) to the shell (2) so as to allow only positive oscillations of the cuff (5) from a predetermined resting position; or to release the cuff (5) from the shell (2) so as to allow the cuff (5) to freely oscillate.

Fig. 1



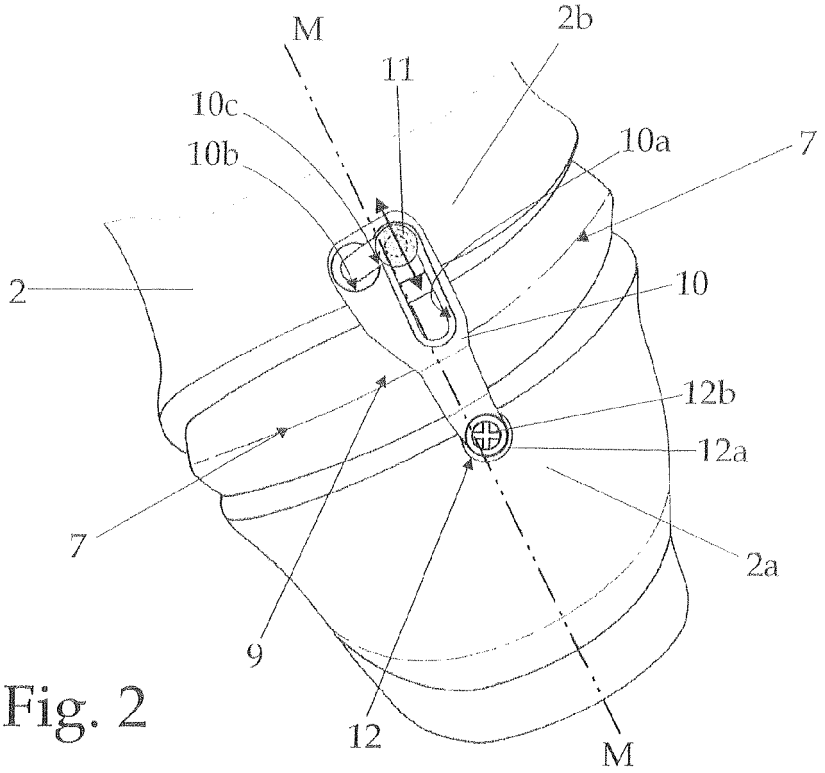

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Fig. 2

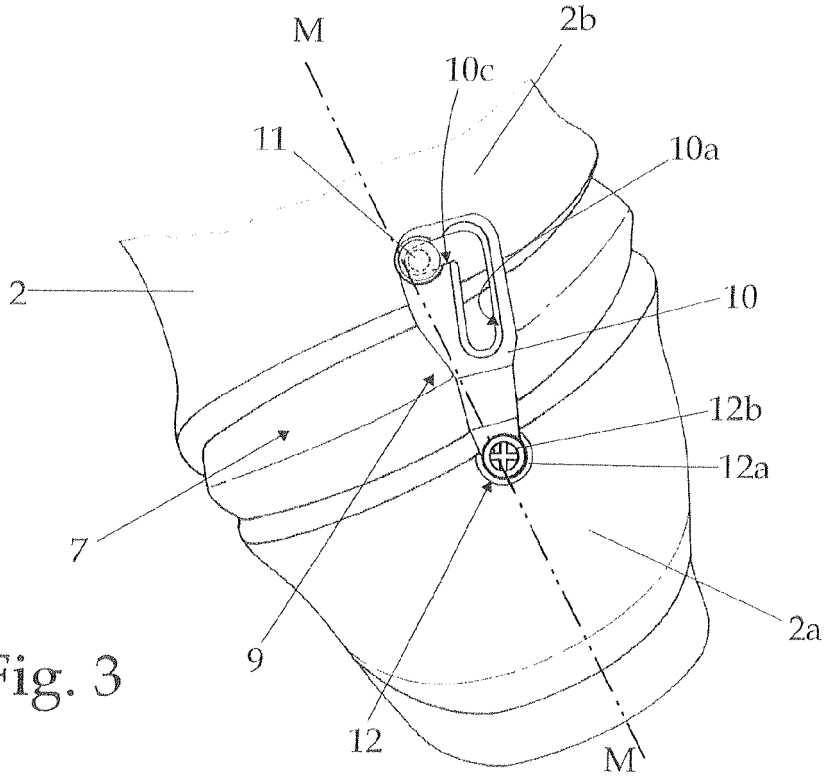
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Fig. 3

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EUROPEAN SEARCH REPORT

Application Number
EP 09 18 0502

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	EP 0 664 969 A2 (TYROLIA FREIZEITGERAETE [AT]) 2 August 1995 (1995-08-02) * column 8, line 29 - column 9, line 26; figures 6,9,10 *	1	INV. A43B5/04
A,D	EP 1 913 828 A1 (SCARPA CALZATURIFICIO SPA [IT]) 23 April 2008 (2008-04-23) * the whole document *	1	
A	US 3 953 930 A (RAMER PAUL C) 4 May 1976 (1976-05-04) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC) A43B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	23 April 2010	Cianci, Sabino

CATEGORY OF CITED DOCUMENTS

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23-04-2010

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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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