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(54) **PRODUCTION METHOD OF A SKI BOOT**

(57) Production method of a ski-boot (1) comprising a substantially shoe-shaped, rigid shell (2) adapted to accommodate the foot of the user and comprising: a substantially basin-shaped, rigid casing (10) that accommodates and encloses the foot of the user; a sole (11) arranged to cover a bottom wall (12) of the rigid casing (10); and a rigid rear insert (14) which is at least partially recessed inside a corresponding hollow seat (15) formed in the rear part of the rigid casing (10), substantially astride the midplane of the boot; the production method of the ski boot (1) being characterized in that it comprises the steps of: forming the rigid casing (10) and the hollow seat (15) intended to accommodate said rigid rear insert (14); piercing the bottom wall (12) of the rigid casing (10) so as to form a transversal guide hole (20) that extends into the bottom wall (12) obliquely to the wall itself and intersects the area/part of the hollow seat (15) intended to be engaged by the shank (17) of the rigid rear insert (14); inserting the rigid rear insert (14) in the hollow seat (15) present in the rigid casing (10); and finally inserting an oblong locking member (18, 28) within said transversal guide hole (20), simultaneously engaging a through hole (19) formed in the shank (17) of the rigid rear insert (14).

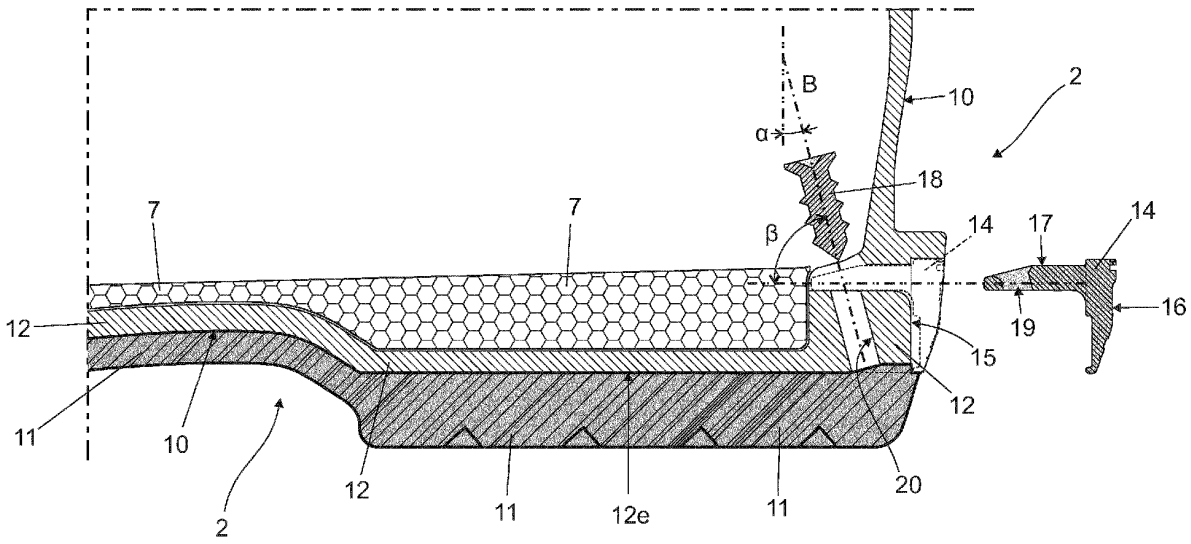

Fig. 2

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Description

PRIORITY CLAIM

[0001] *This application claims priority from Italian Patent* Application No. 102017000004582 filed on 17/01/2017, the *disclosure of which is incorporated by reference.*

[0002] The present invention relates to a production method of a ski boot.

[0003] More specifically, the present invention relates to a production method of a ski mountaineering boot, to which the following description will make explicit reference without thereby losing generality.

[0004] As is well known, most of ski mountaineering boots comprises: a lower rigid shell, which is substantially shoe -shaped so as to accommodate the foot of the user, and has a lower part specifically structured to be fixed to the back of a downhill ski or the like by means of a specific ski mountaineering binding device; an upper rigid cuff, which is shaped so as to embrace the lower part of the leg of the user from behind, and is hinged to the upper part of the shell so as to be able to rotate about a transversal reference axis which is perpendicular to the vertical midplane of the boot and locally substantially coincident with the articulation axis of the ankle; and an inner-boot made of a soft and thermal-insulating material, which is inserted inside the shell and the cuff, and is shaped so as to accommodate and protect the foot as well as the lower part of the leg of the user.

[0005] The ski mountaineering boots mentioned above are also provided with a shell closing mechanism and a cuff closing mechanism, both manually operated.

[0006] In turn, the shell of ski mountaineering boots basically consists of a substantially basin-shaped, rigid casing which is made of plastic material via injection moulding and is shaped so as to accommodate and cover the foot of the user roughly up to ankle height; and of a sole having a threaded profile, which is made of vulcanized rubber or other elastomeric material with a high friction coefficient, and is glued directly onto the bottom wall of the rigid casing.

[0007] In addition, the shell of ski mountaineering boots additionally includes a rigid front insert and a rigid rear insert, both made of metallic material.

[0008] The rigid front insert has a platelike structure, is embedded/incorporated within the bottom wall of the rigid casing at the tip of the boot, i.e. beneath the phalangeal region of the sole of the foot, and is finally shaped so as to emerge/surface outside the rigid casing, at the two lateral sides of the tip of the shell.

[0009] The rigid rear insert, on the other hand, has a platelike structure, is substantially T-shaped, and is firmly fixed to the rigid casing in the area of the heel of the ski boot, in vertical position and astride the vertical midplane of the boot. The lying plane of the rigid rear insert is therefore orthogonal to the midplane of the boot.

[0010] In more detail, the rigid rear insert is usually recessed inside a hollow seat formed in the rear part of the rigid casing, i.e. in the area of the heel of the boot, astride the vertical midplane of the boot.

[0011] In US patent US7779559, the rigid rear insert is firmly fixed to the casing by a self-threading screw extending horizontally and perpendicularly to the lying plane of the insert, and engages in pass-through manner a hole formed at the centre of the insert before penetrating into the rigid casing while remaining astride the midplane of the boot.

[0012] More recently, there have been introduced substantially nail-shaped, rigid rear inserts which are provided with a substantially T-shaped, platelike head, and with a rear locking stem or shank that has a platelike structure and protrudes in cantilever manner from the head while remaining substantially perpendicular to the lying plane of said head.

[0013] The rigid rear insert is recessed into the casing of the shell in the area of the heel of the boot, again astride the midplane of the boot, with the platelike head facing the outside of the shell and in vertical position orthogonal to the midplane of the boot. The platelike shank, in turn, extends inside the bottom wall of the rigid casing while remaining substantially horizontal and parallel to the bottom wall, and is firmly locked in place by a transversal self-threading screw which is screwed into the bottom wall of the casing from top to bottom, so as to engage the shank in pass-through manner while remaining astride the midplane of the boot.

[0014] While ensuring greater resistance to torsion, the rigid rear insert provided with the platelike locking shank has made the assembly of the shell much more laborious.

[0015] In fact, the tool that must screw the shank-locking screw must enter the shell from the upper opening up to abut against the bottom wall of the casing, with all the limitations that this entails given the limited space available to correctly orient the tool.

[0016] In addition, experimental tests have shown a worrying increase in the percentage of self-threading screws that, during the fixing of the rear shank, bend or break while penetrating the bottom wall of the rigid casing, thereby irreparably damaging the inside of the shell. A drawback almost certainly caused by imperfect alignment of the tool.

[0017] Aim of the present invention is to simplify the assembly of the rear inserts with locking shank, while at same time reducing the percentage of self-threading screws that bend or break when fixing the rear insert.

[0018] In compliance with the above aims, according to the present invention there is provided a production method of a ski boot as defined in claim 1 and preferably, though not necessarily, in any one of the claims dependent thereon.

[0019] The present invention will now be described with reference to the accompanying drawings, which illustrate a non-limiting embodiment thereof, in which:

- Figure 1 is a perspective view of a ski boot realized

according to the teachings of the present invention;

- Figure 2 is a partially exploded side view of the rear part of the shell of the ski boot shown in Figure 1, sectioned along the midplane of the boot and with parts removed for clarity;
- Figures 3 to 7 schematically illustrate as many steps of the production method of the ski boot shown in Figures 1 and 2; whereas
- Figure 8 is a variant of the shell production method shown in Figures 6 and 7.

[0020] With reference to Figures 1 and 2, number 1 denotes, as a whole, a ski boot specially structured for practising ski mountaineering, i.e. a ski mountaineering boot.

[0021] Firstly, the ski boot 1 comprises: a substantially shoe-shaped, lower rigid shell 2 which is adapted to accommodate the foot of the user and has the lower part specifically structured/shaped to couple/fasten in a rigid and stable, though easily releasable manner, to a ski binding device (not shown) of a known type, which in turn is adapted to be fixed in rigid manner to the back of a generic downhill ski or the like; and a rigid cuff 3 which is designed to embrace the lower part of the leg of the user, and is hinged to the upper part of shell 2 so as to be able to freely pivot about a transversal rotation axis A, which is locally substantially perpendicular to the vertical midplane of the boot and is also substantially coincident with the articulation axis of the ankle of the user.

[0022] More specifically the lower part of shell 2 is provided with a front tip 4 and a rear heel 5.

[0023] The front tip 4 is preferably structured so as to couple/fasten in known manner to the toe piece (not shown) of a ski mountaineering binding device, which in turn is firmly fixed to the back of a generic downhill ski or the like; whereas the rear heel 5 is preferably structured so as to couple/fasten in known manner to the heel piece (not shown) of the same ski mountaineering binding device.

[0024] Preferably, the lower part of shell 2 additionally has a threaded profile so that it can grip on snow or ice, thereby allowing the user to relatively safely walk on snow and ice.

[0025] With reference to Figures 1 and 2, moreover, the ski boot 1 preferably additionally comprises: an innerboot 6 which is shaped so as to accommodate and protect at least the foot of the user, and which is inserted, preferably in manually removable manner, into the shell 2 and optionally also into the cuff 3; and preferably also an insole 7 which is arranged inside the shell 2 resting on the bottom of shell 2, so as to be interposed between the bottom of shell 2 and the innerboot 6.

[0026] In more detail, in the example shown, the innerboot 6 has a soft and thermal-insulating structure, optionally also of the thermo-formable type, and is preferably shaped so as to accommodate the foot and the lower part of the leg of the user roughly up to the top of the calf.

[0027] Preferably the ski boot 1 furthermore comprises also a series of manually-operated closing devices 8 which are suitably distributed on the shell 2 and/or the cuff 3, and are structured so as to be able to selectively close/ tighten the shell 2 or the cuff 3 on the leg of the user, in order to firmly immobilize the user's leg inside the ski boot 1, or rather the innerboot 6.

[0028] In the example shown, in particular, the closing devices 8 preferably include a series of lever closing buckles which are arranged astride the shell 2 or the cuff 3, so as to be able to selectively close/tighten the shell 2 or the cuff 3 on the user's foot or leg.

[0029] Preferably, the ski boot 1 is additionally provided with a manually- or automatically- operated cuff-locking device 9 which is preferably located astride the shell 2 and the cuff 3 in the area above the heel of the boot, and is structured so as to be able to selectively connect the cuff 3 in rigid manner to the shell 2, so as to prevent the cuff 3 from freely pivoting about the rotation axis A.

[0030] In more detail, the cuff-locking device 9 is preferably structured so as to be able to, selectively and alternately:

- rigidly lock the cuff 3 to the shell 2 in a given descent position in which the cuff 3 is tilted forwards with respect to the vertical by a predetermined angle preferably, though not necessarily, ranging between 3° and 30°, so as to prevent any pivoting movement of the cuff 3 on the shell 2; and
- fully unlock/release the cuff 3 from the shell 2 so as to allow the cuff 3 to freely pivot back and forth on the shell 2 about the rotation axis A, while remaining on the midplane of the boot.

[0031] With reference to Figures 1 and 2, the shell 2 in turn comprises: a substantially basin-shaped, rigid casing 10 which is made of a plastic or composite material and is shaped so as to accommodate, enclose and protect the foot of the user roughly up to the height of the ankle; and a sole 11 preferably having a threaded profile, which is made of vulcanized rubber or other elastomeric material with a high friction coefficient, and is firmly fixed beneath the rigid casing 10, substantially covering the whole bottom wall 12 of rigid casing 10.

[0032] In more detail, in the example shown, the rigid casing 10 is preferably realized via injection moulding, and is preferably made of poly[ether block amide] (PEBA) or other similar thermoplastic polymeric material.

[0033] The sole 11, in turn, is preferably unmovably fixed to the bottom wall 12 of rigid casing 10 by means of gluing.

[0034] With reference to figures 1 and 2, furthermore the shell 2 additionally comprises a rigid front insert 13 and a rigid rear insert 14, both preferably made of metallic material.

[0035] The rigid front insert 13 has a platelike structure and is embedded/incorporated into the bottom wall 12 of rigid casing 10 roughly at the tip 4 of shell 2, i.e. beneath the phalangeal region of the sole of the foot, and is struc-

tured so to surface/emerge outside the rigid casing 10 in a substantially specular position on opposite sides of the midplane of the boot, so that its two emerging ends can couple/fasten in known manner to the jaw of the toe piece of the ski mountaineering binding device.

[0036] The rigid front insert 13 is thus located astride the midplane of the boot, locally substantially perpendicular to the midplane of the boot and substantially coplanar with the bottom wall 12 of rigid casing 10.

[0037] The rigid rear insert 14, on the other hand, is substantially nail-shaped and is at least partially recessed into a hollow seat or recess 15 realized in the rear part of rigid casing 10, i.e. at the rear heel 5 of the shell, substantially astride the midplane of the boot, so as to emerge outside of the rigid casing 10 and couple/fasten in known manner to the heel piece of the ski mountaineering binding device.

[0038] In more detail, the rigid rear insert 14 is provided with a substantially T-shaped, platelike head 16 and with a preferably substantially platelike, oblong rear shank 17 extending in cantilever manner from the platelike head 16 in a direction substantially perpendicular to the lying plane of the platelike head 16.

[0039] The platelike head 16 emerges outside of the seat 15, and is arranged on the rigid casing 10 in a position substantially vertical and orthogonal to the midplane of the boot.

[0040] In other words, the lying plane of platelike head 16 is substantially vertical and orthogonal to the midplane of the boot.

[0041] The rear shank 17, in turn, extends at least partially within the thickness of the bottom wall 12 of rigid casing 10 while remaining substantially astride the midplane of the boot, and preferably also while remaining substantially horizontal and locally substantially parallel to the bottom wall 12 of the casing.

[0042] With particular reference to Figure 2, the rear shank 17 is additionally firmly held in place inside the seat 15 by a transversal locking screw 18, preferably made of metallic material and preferably of the self-threading type, which engages a through hole 19 specially formed in the rear shank 17, preferably close to the distal end of the same shank 17, and moreover extends/screws inside a substantially rectilinear, transversal guide hole 20 which extends into the bottom wall 12 of rigid casing 10 obliquely/transversely to the same bottom wall 12, and intersects the area/part of the seat 15 engaged by the portion of rear shank 17 provided with the through hole 19.

[0043] Preferably, the locking screw 18 is furthermore inserted into the transversal guide hole 20 so that the head of the screw is turned towards/faces the inside of the rigid casing 10.

[0044] In more detail, the guide hole 20 extends transversely to the bottom wall 12 of rigid casing 10 and to the rear shank 17 of rigid rear insert 14, and preferably has a diameter which is slightly smaller than that of the stem of the locking screw 18.

[0045] Preferably, the guide hole 20 is additionally realized in the bottom wall 12 of rigid casing 10, astride the midplane of the boot.

[0046] In other words, the guide hole 20 extends into the bottom wall 12 of rigid casing 10 while remaining coaxial with a reference axis B that substantially lies on the midplane of the boot.

[0047] In addition, the longitudinal axis B of guide hole 20 is also inclined by a predetermined angle with respect to the rear shank 17.

[0048] With reference to Figure 2, in the example shown, in particular, the guide hole 20 has a diameter which is preferably 5% smaller than the diameter of the stem of the locking screw 18.

[0049] In more detail, in the example shown, the guide hole 20 has a diameter preferably ranging between 2 and 3 mm (millimetres), and preferably, though not necessarily, equal to 2,35 mm (millimetres).

[0050] Preferably, the longitudinal axis B of guide hole 20 is moreover inclined with respect to the vertical by an angle α ranging between 0° and 30°.

[0051] Preferably, the longitudinal axis B of guide hole 20 is furthermore inclined with respect to the lying plane P of rear shank 17 by an angle β ranging between 60° and 90°.

[0052] In addition, the guide hole 20 extends into the bottom wall 12 of rigid casing 10 preferably starting from the outer surface 12e of the bottom wall 12, i.e. starting from the surface of bottom wall 12 intended to be covered by the sole 11.

[0053] Preferably, the guide hole 20 is furthermore a through hole.

[0054] In other words, the guide hole 20 passes through the entire thickness of the bottom wall 12 of rigid casing 10, and preferably ends inside the rigid shell 10.

[0055] The sole 11, finally, is preferably adapted to plug/ seal the lower mouth of the guide hole 20.

[0056] Operation of ski boot 1 is easily inferable from the above description and requires no further explanation.

[0057] With reference to Figures 3, 4, 5 and 6, the production method of ski boot 1 comprises the steps of

- forming the rigid casing 10 of shell 2 and the seat 15 intended to accommodate the rigid rear insert 14, preferably by means of an injection moulding process;
- piercing the bottom wall 12 of rigid casing 10, preferably starting from the outer surface 12e of the bottom wall 12 of the casing, so as to form a rectilinear guide hole 20 which extends into the bottom wall 12 of rigid casing 10 transversely/ obliquely to said bottom wall 12, and intersects the area/part of the seat 15 intended to be engaged by the portion of the rear shank 17 provided with the through hole 19;
- inserting the rigid rear insert 14 into the seat 15 present in the rear part of rigid casing 10; and then
- screwing the locking screw 18 into the guide hole

20, preferably starting from the inner surface of the bottom wall 12 of rigid casing 11 and preferably with the aid of an automatic screwdriver 100, while simultaneously engaging the through hole 19 present in the rear shank 17 of the rigid rear insert 14, so as to lock the rigid rear insert 14 in the seat 15.

[0058] Obviously, the insertion of the rigid rear insert 14 into the seat 15 can also take place prior to formation of the transversal guide hole 20.

[0059] With reference to Figure 7, preferably, after locking the rigid rear insert 14 in the seat 15, the production method of ski boot 1 additionally comprises the step of

- firmly attaching the sole 11 onto the bottom wall 12 of rigid casing 10, preferably by gluing and preferably so as to simultaneously close/plug the lower mouth of guide hole 20.

[0060] Optionally, before firmly attaching the sole 11 onto the bottom wall 12 of rigid casing 10, the production method of ski boot 1 also includes the step of

- obstructing the lower mouth of the guide hole 20 with filling and/or sealing material.

[0061] The production method of ski boot 1 described above offers many advantages.

[0062] The presence of guide hole 20 allows the transversal locking screw 18 to be screwed into the bottom wall 12 of rigid casing 10 much more easily, practically eliminating the risks of bending and/or breakage of the locking screw 18 resulting from imperfect orientation/alignment of the automatic screwdriver 100 with the bottom wall 12 of the casing.

[0063] Experimental tests, in fact, have highlighted that the transversal guide hole 20 succeeds in centring and automatically straightening the locking screw 18, regardless of the positioning of the automatic screwdriver 100 inside the rigid casing 10.

[0064] Moreover, in case it is necessary to replace the rigid rear insert 14, the presence of guide hole 20 allows a more easy and quick removal of locking screw 18.

[0065] In addition, the presence of guide hole 20 ensures a more accurate positioning of the rigid rear insert 14 inside the rigid casing 10.

[0066] The piercing of the bottom wall 12 of rigid casing 10 starting from the outer surface 12e of the bottom wall 12, furthermore, greatly simplifies the realization of the transversal guide hole 20.

[0067] In fact, outside the rigid casing 10 there are no obstacles that may prevent or hinder the correct positioning of the drilling bit on the bottom wall 12 of the rigid casing 10.

[0068] Lastly, the realization of transversal guide hole 20 starting from the outer surface 12e of the bottom wall 12 allows the use of the sole 11 for closing/plugging the mouth of the hole after having firmly fixed the rigid rear insert 14 to the rigid casing 10.

[0069] It is finally clear that changes and variants may be made to ski boot 1 and to the production method described above without however departing from the scope of the present invention.

[0070] For example, with reference to Figure 8, in a different embodiment, the locking screw 18 can be replaced by a threaded rod 28 of the self-threading type, i. e. a self-threading grub-screw, which is screwed into the guide hole 20 preferably starting from the outer surface 12e of the bottom wall 12 of rigid casing 10, up to reach and engage the through hole 19 of rear shank 17.

[0071] Finally, in a less sophisticated and non-shown embodiment, the locking screw 18 may be replaced by a locking pin which is adapted to be force-fitted into the transversal guide hole 20, starting from the outer 12e or inner surface of the bottom wall 12 of rigid casing 10, up to reach and engage the through hole 19 of rear shank 17.

Claims

1. A production method of a ski-boot (1) comprising a substantially shoe-shaped, rigid shell (2) adapted to accommodate the foot of the user and comprising: a substantially basin-shaped, rigid casing (10) that accommodates and encloses the foot of the user; a sole (11) arranged to cover a bottom wall (12) of the rigid casing (10); and a rigid rear insert (14) which is at least partially recessed into a corresponding hollow seat (15) formed in the rear part of the rigid casing (10), substantially astride the midplane of the boot; the production method of the ski-boot (1) **being characterized in that** it comprises the steps of:

   - forming the rigid casing (10) and the hollow seat (15) intended to accommodate said rigid rear insert (14);
   - piercing the bottom wall (12) of the rigid casing (10) so as to form a transversal guide hole (20) that extends into the bottom wall (12) obliquely to the wall itself and intersects the area/part of the hollow seat (15) intended to be engaged by the shank (17) of the rigid rear insert (14);
   - inserting the rigid rear insert (14) in the hollow seat (15) present in the rigid casing (10); and finally
   - inserting an oblong locking member (18, 28) into said transversal guide hole (20), simultaneously engaging a through hole (19) formed in the shank (17) of the rigid rear insert (14).

2. Production method according to Claim 1, **characterized in that** the transversal guide hole (20) extends into the bottom wall (12) of the rigid casing (10) while remaining coaxial with a reference axis (B) that lies substantially on the midplane of the boot.

3. Production method according to Claim 1 or 2, **characterized in that** the transversal guide hole (20) extends into the bottom wall (12) of the rigid casing (10) while remaining substantially coaxial with a reference axis (B) which is inclined with respect to the vertical by an angle (α) ranging between 0° and 30°.

4. Production method according to Claim 1, 2 or 3, **characterized in that** the transversal guide hole (20) extends into the bottom wall (12) of the rigid casing (10) while remaining substantially coaxial with a reference axis (B) which is inclined with respect to the lying plane (P) of the shank (17) by an angle (β) ranging between 60° and 90°.

5. Production method according to any one of the preceding claims, **characterized in that** the transversal guide hole (20) extends into the bottom wall (12) of the rigid casing (10), starting from an outer surface (12e) of the bottom wall (12).

6. Production method according to any one of the preceding claims, **characterized in that** the transversal guide hole (20) is a pass-through hole.

7. Production method according to any one of the preceding claims, **characterized in that** the transversal guide hole (20) has a diameter smaller than that of said oblong locking member (18, 28).

8. Production method according to any one of the preceding claims, **characterized in that** it additionally comprises the step of firmly attaching the sole (11) onto the bottom wall (12) of the rigid casing (10).

9. Production method according to Claim 8, **characterized in that** the sole (11) is attached onto the bottom wall (12) of the rigid casing (10) by gluing.

10. Production method according to Claim 8 or 9, **characterized in that** the sole (11) is adapted to close/plug the lower mouth of the transversal guide hole (20).

11. Production method according to any one of the preceding claims, **characterized in that** the rigid casing (10) is formed by means of an injection moulding process.

12. Production method according to any one of the preceding claims, **characterized in that** said oblong locking member (18, 28) is a self-threading screw or rod (18, 28), which is screwed into the transversal guide hole (20).

13. Production method according to Claim 12, **characterized in that** said self-threading screw or rod (18, 28) is screwed into the transversal guide hole (20) with the aid of an automatic screwdriver (100).

14. Production method according to any one of Claims from 1 to 11, **characterized in that** said oblong locking member is a locking pin which is force-fitted into the transversal guide hole (20).

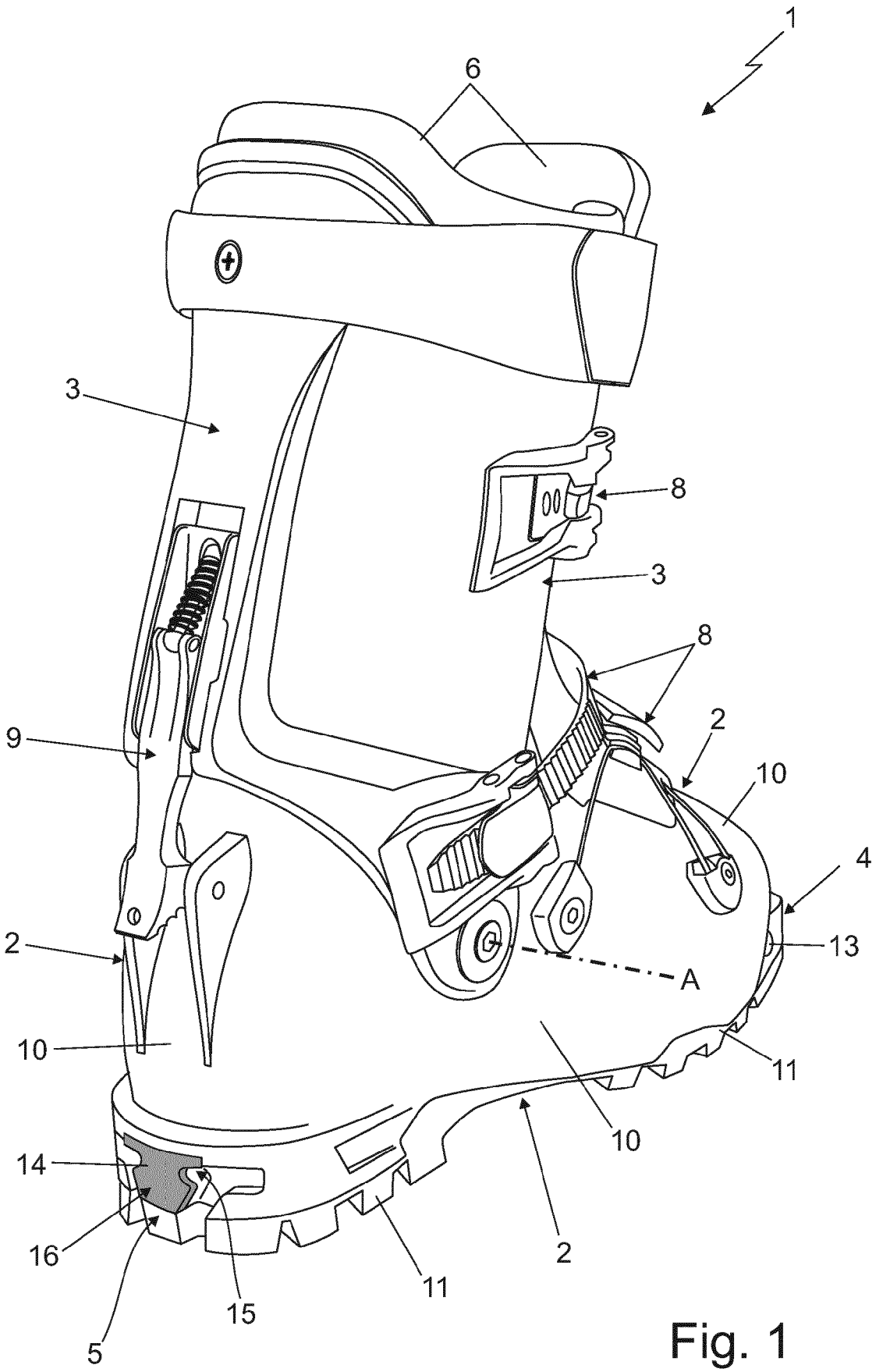

Fig. 1

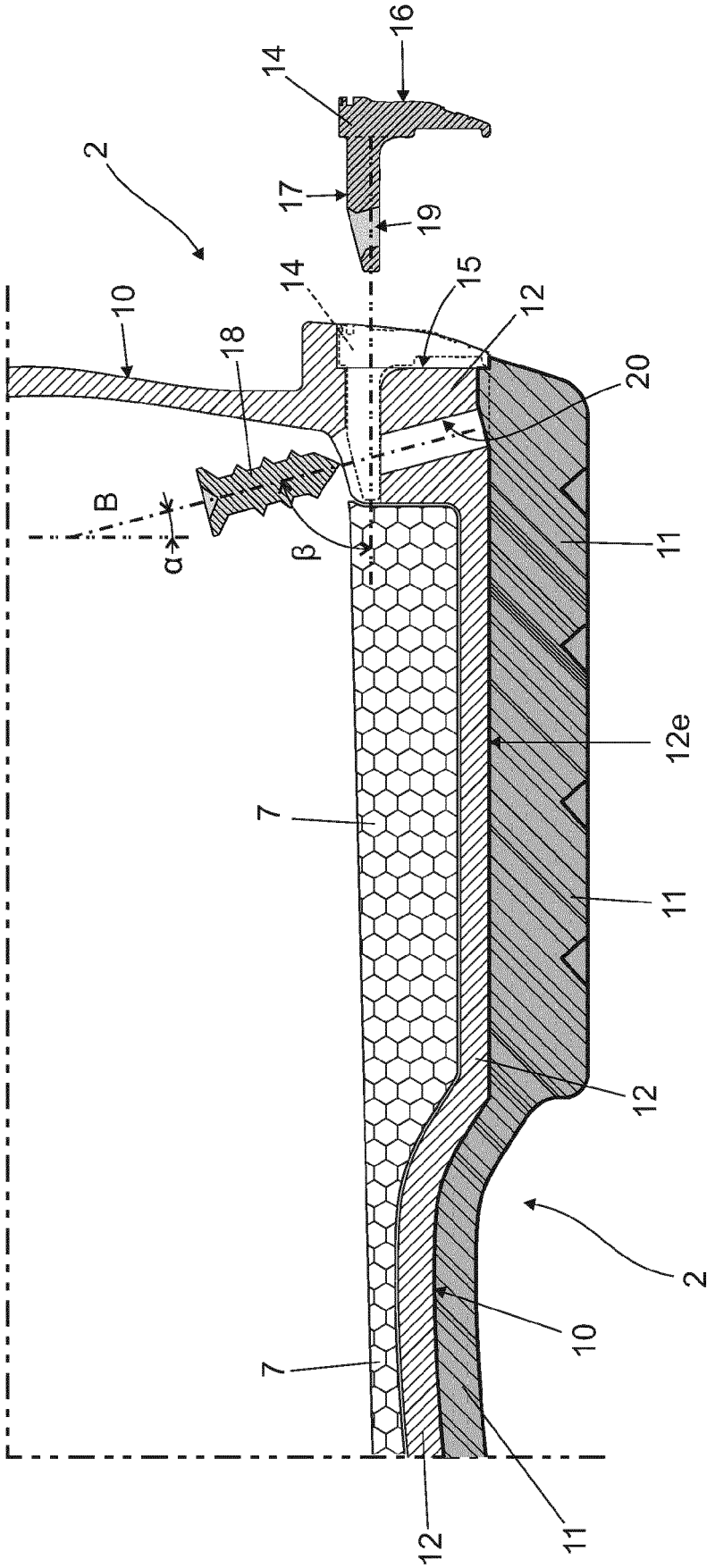

Fig. 2

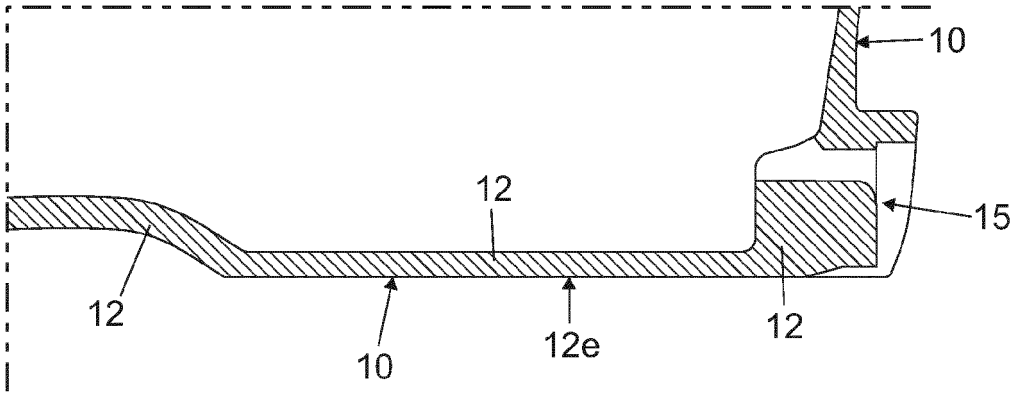

Fig. 3

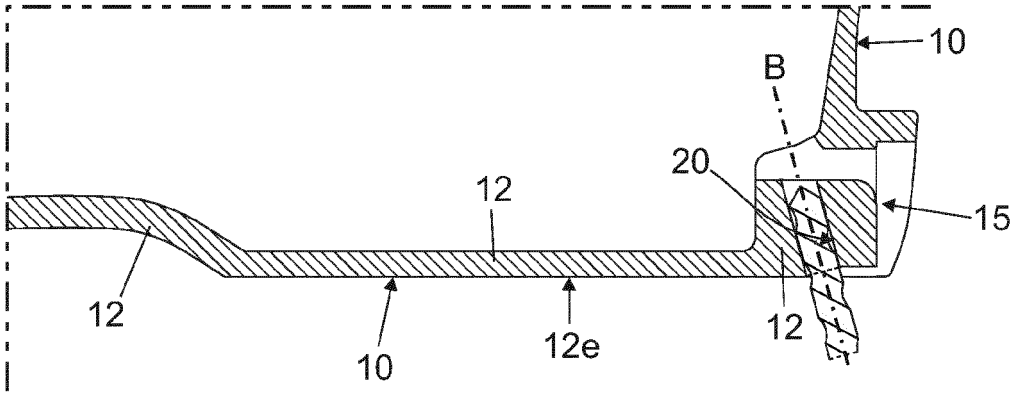

Fig. 4

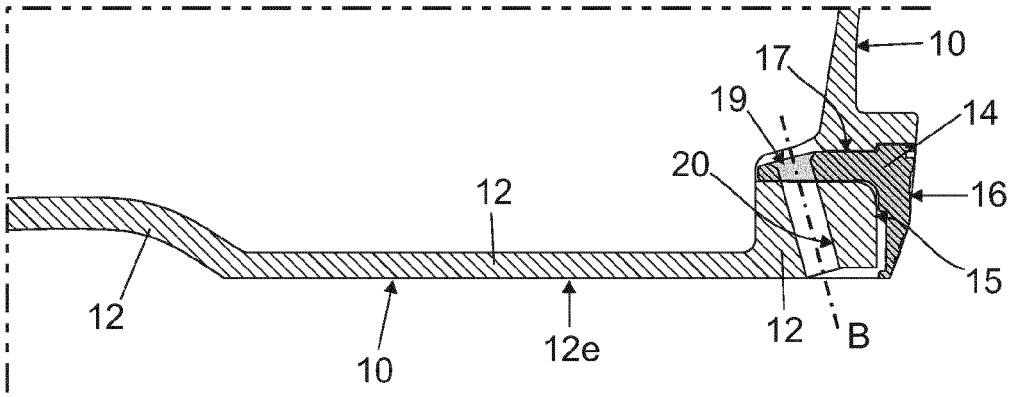

Fig. 5

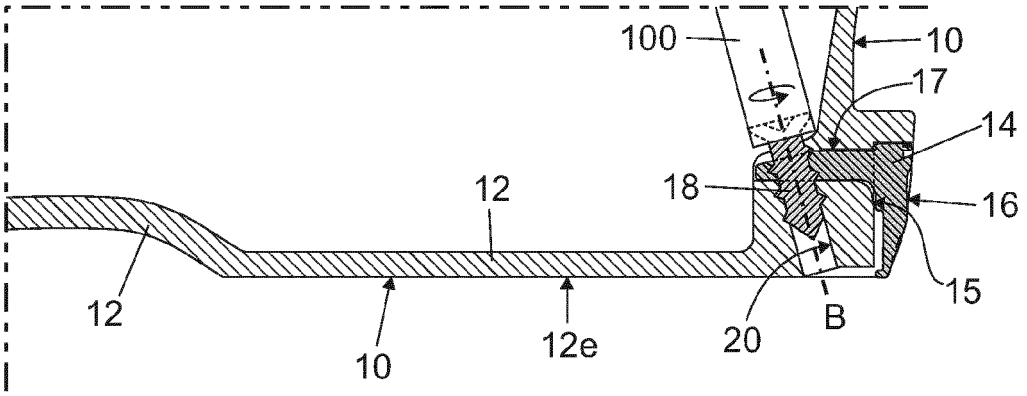

Fig. 6

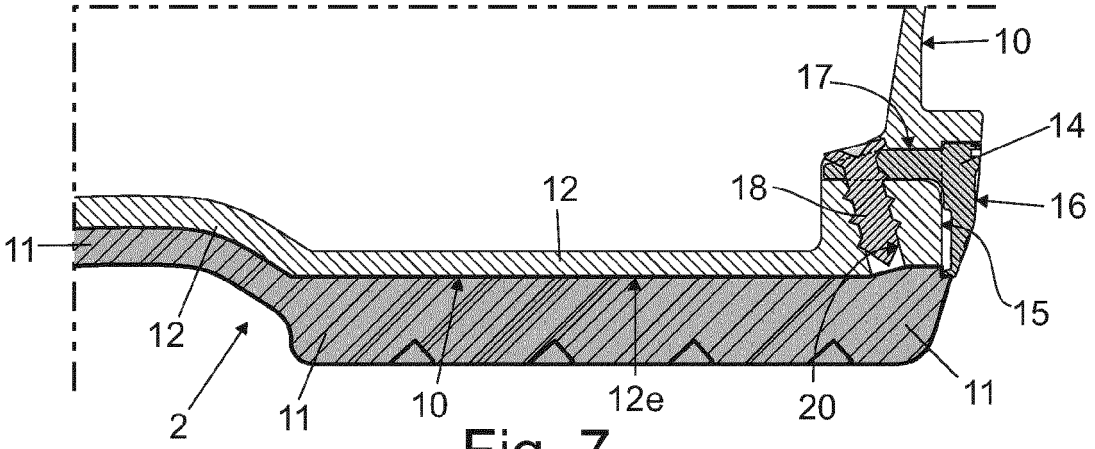

Fig. 7

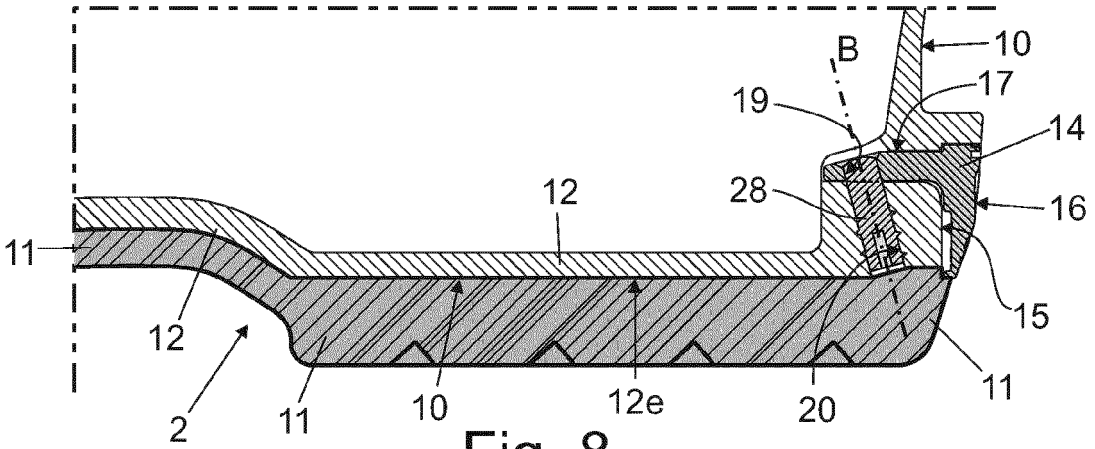

Fig. 8

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European Patent Office
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EUROPEAN SEARCH REPORT

Application Number
EP 18 15 2191

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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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	16 May 2018	Claudel, Benoît

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EP 2932863 A1	21-10-2015	NONE	

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- US 7779559 B **[0011]**