(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
1 May 2014 (01.05.2014)

WIPO | PCT

(10) International Publication Number
WO 2014/064657 A1

(51) International Patent Classification:
A43B 5/04 (2006.01)

(21) International Application Number:
PCT/IB2013/059671

(22) International Filing Date:
25 October 2013 (25.10.2013)

(25) Filing Language: Italian

(26) Publication Language: English

(30) Priority Data:
TV2012A000203 26 October 2012 (26.10.2012) IT

(71) Applicant: **CALZATURIFICIO S.C.A.R.P.A. S.P.A.** [IT/IT]; Viale Enrico Fermi, 1, Asolo (IT).

(72) Inventor: **PARISOTTO, Davide**; Via Enrico Fermi, 3, I-31010 Casella d'Asolo (IT).

(74) Agents: **BOGGIO, Luigi** et al.; Studio Torta S.p.A., Via Viotti, 9, I-10121 Torino (IT).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(54) Title: SKI BOOT

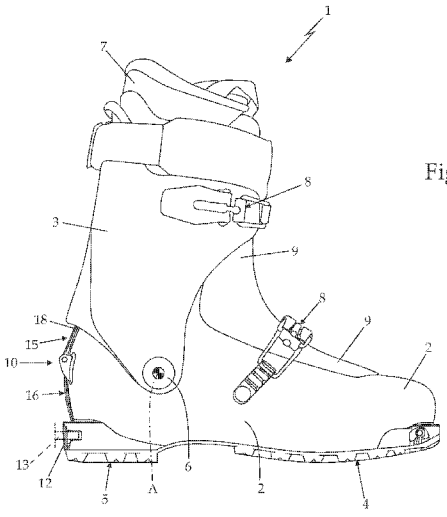


Fig. 1

(57) Abstract: A ski boot (1) comprising a rigid shell (2) which is shaped so as to accommodate the foot' of the user, and a rigid, cuff (3) which is shaped so as · to surround the ankle of the user and is pivotally jointed on the shell (2) so as to be able to rotate about, a reference axis (A) locally substantially coincident with the articulation " axis of, the ankle of the user; the shell (2) being provided with a rear heel (5) which is structured so as to be able to connect/couple in a rigid and stable, though easily releasable, manner to the heel-piece (13, 43) of a ski binding device; the boot (1) being also provided with a cuff locking device (10) which is structured so as to be able to alternatively lock the cuff (3) rigidly to the shell (2) for preventing any pivoting movement of the cuff (3) on the shell (2), or release the cuff (3) from the shell (2) so as to allow the cuff (3) to pivot freely about said reference axis (A); the cuff locking device (10) being structured so as to be able to automatically lock the cuff (3) to the shell (2) to- prevent any pivot - ing movement of the cuff (3) on the shell (2), as a result of connection/coupling of the heel (5) of the boot to the heel-piece (13, 43) of the ski binding device.

WO 2014/064657 A1

SKI BOOT

TECHNICAL FIELD

The present invention relates to a ski boot.

More in detail, the present invention relates to a mountaineering ski boot, use to which the following disclosure will explicitly refer without however loosing in generality.

BACKGROUND ART

As known, more recent mountaineering boots are made up of a rigid shell made of plastic material, which is shaped so as to accommodate the foot of the skier and has the lower part specifically structured to be fixed on the back of a downhill ski or the like by means of specific known mountaineering ski binding devices; of a rigid cuff made of plastic material, which is shaped so as to embrace the lower section of the skier's leg from behind, and is hinged to the upper part of the shell so as to rotate about a transversal reference axis substantially coincident with the articulation axis of the ankle and is substantially perpendicular to the centerline plane of the boot; of an inner liner made of soft and thermal insulating material, which is inserted in removable manner inside the shell and the cuff, and is shaped so as to envelop and protect both the foot and the lower section of the skier's leg; and finally of a series of manually-operated closing buckles, which are

conveniently distributed on the shell and on the cuff, and are structured so as to selectively close/tighten the shell and the cuff so as to immobilize the skier's leg stably inside the liner.

Finally, most mountaineering ski boots are provided with a manually-operated cuff locking device which is structured so as to selectively, and alternatively,

- rigidly lock the cuff to the shell so as to prevent any pivoting movement of the cuff on the shell; or
- release the cuff completely from the shell so as to allow the cuff to freely pivot on the shell, while remaining on the centerline plane of the boot.

More in detail, in the more sophisticated mountaineering ski boots currently on the market, the cuff locking device basically comprises a rigid connecting rod which has the lower end hinged on the shell at the heel of the boot, so as to freely rotate about a reference axis locally substantially perpendicular to the centerline plane of the boot, and which extends on the centerline plane of the boot up to reach the portion of the cuff immediately above the heel of the boot; and a manually-operated mechanical locking member which is fixed in rigid manner on the cuff immediately above the heel of the boot, so as to be

engaged in an axially sliding manner by the end part of the rod, and is structured so as to selectively prevent any relative movement between the connecting rod and the locking member, so as to lock the cuff in a rigid manner to the shell of the boot.

Unfortunately, arrangement of the rod mechanical locking member on the rear part of the cuff, immediately above the heal of the boot, makes it relatively difficult for the user to reach and activate the cuff locking device, with all the drawbacks this involves when the skier is in particularly adverse weather conditions.

DISCLOSURE OF INVENTION

Aim of the present invention is to make a cuff locking device which is easier and more practical to operate as compared to the locking devices currently used, and which is also lighter and less cumbersome.

In compliance with the these aims, 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 claims dependent thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

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 the side view of a mountaineering ski

boot made according to the teachings of the present invention;

- Figure 2 is an exploded perspective view of the rear part of the Figure 1 mountaineering ski boot, with parts removed for clarity;

- Figure 3 is a sectional view of the rear part of the Figure 1 mountaineering ski boot, with parts removed for clarity;

- Figure 4 is an exploded view of the cuff locking device of the Figure 1 mountaineering ski boot ;

- Figure 5 is a sectional view of the rear part of a second embodiment of the Figure 1 mountaineering ski boot, with parts removed for clarity;

- Figure 6 is a sectional view of the rear part of a third embodiment of the Figure 1 mountaineering ski boot, with parts removed for clarity; whereas

- Figure 7 shows the rear part of a fourth embodiment of the Figure 1 mountaineering ski boot, with parts in section and parts removed for clarity.

BEST MODE FOR CARRYING OUT THE INVENTION

With reference to figure 1, number 1 indicates as a whole a ski boot, and in particular a ski boot specifically structured for practising the sport of ski mountaineering.

The ski boot 1 is basically made up of a rigid shell 2 made of plastic or composite material, which is

shaped so as to accommodate the foot of the user and has the lower part specifically structured to be fixed on the back of a generic downhill ski or the like by means of a specific known mountaineering ski binding device; and of a rigid cuff 3 made of plastic or composite material, which is preferably substantially C-shaped so as to surround the lower section of the user's leg from behind, and is hinged on the upper part of shell 2 so as to freely pivot about a transversal reference axis A, which is locally substantially perpendicular to the vertical centerline plane of the boot (i.e. perpendicular to the plane of the sheet in figure 1), and is also locally substantially coincident with the articulation axis of the user's ankle.

More in detail, the lower part of shell 2 is provided with a front sole 4 and with a rear heel 5 which are specifically structured/shaped to be connected /coupled in a rigid and stable, though easily releasable manner, respectively with the toe-piece and with the heel-piece of a known ski binding device which is in turn structured to be fixed in rigid manner on the back of a downhill ski or the like.

In the example shown, in particular, the front sole 4 and the rear heel 5 are preferably structured/shaped to be connected/coupled in a rigid and stable, though easily releasable, manner respectively with the toe-

piece and with the heel-piece of a known mountaineering ski binding device which, in turn, is structured to be fixed in a rigid manner on the back of a downhill ski or the like.

Cuff 3 is instead fixed in freely rotatable manner on shell 2 by means of two side connection hinges 6 which are arranged on the internal and external lateral sides of shell 2 and of cuff 3, aligned along axis A, so as to allow cuff 3 to freely pivot both forwards and backwards on shell 2 while always remaining on a reference plane which is orthogonal to axis A and substantially coincident with the centerline plane of the boot.

In the example shown, in particular, shell 2 and cuff 3 are preferably, though not necessarily, made of nylon (polyamide), PEBAX (polyester-amide) or similar plastic polymers. Alternatively, shell 2 and/or cuff 3 could also consist of shells which have preferably, though not necessarily, a monolithic structure and are made of a composite material formed by one or more overlapping layers of carbon fibre and/or fibre glass and/or aramid fibre, which are conveniently interwoven and/or overlaped each other and are embedded in a matrix of epoxy, phenolic or polyester resin preferably of the thermosetting type.

With reference to figure 1, ski boot 1 also

comprises an inner liner 7 preferably made of soft and thermal insulating material and which is accommodated inside shell 2 and cuff 3 preferably, though not necessarily, in a removable manner, and is shaped so as to envelop and protect the foot and the lower section of the user's leg; and a manually-operated mechanical boot closing device 8 which is structured to selectively close/tighten shell 2 and cuff 3 so as to immobilize the user's leg stably inside liner 7.

In the example shown, in particular, shell 2 is preferably equipped with a longitudinal slit (not shown) which extends along the upper part of shell 2, while remaining locally substantially coplanar to the vertical centerline plane of the boot, and is dimensioned so as to allow shell 2 to be temporarily widened to facilitate the introduction of the user's foot into liner 7.

Furthermore, with reference to figure 1, boot 1 is also preferably equipped with an upper protective tongue 9 oblong and flattened in shape, which is preferably, though not necessarily, made of plastic or composite material, and is arranged resting on shell 2 in the area above the instep of the foot and the lower section of the leg, to cover the longitudinal slit of shell 2.

In other words, the protective tongue 9 is substantially L-bent and extends grazing shell 2 in the area immediately above the instep of the foot and the

tibia-astragalus junction of the ankle, to cover the longitudinal slit of shell 2, and then ascends along the leg up to reach and slip under cuff 3, so as to cover the lower section of the tibia.

With reference to figure 1, the mechanical boot closing device 8 instead preferably, though not necessarily, consists of an appropriate number of manually-operated lever closing buckles 8 which are arranged on shell 2 and/or on cuff 3 and/or on protective tongue 9 so as to selectively close/tighten shell 2 and/or cuff 3 to immobilize the user's leg stably inside liner 7.

With reference to figure 1, the ski boot 1 is finally provided with a cuff locking device 10 which is structured so as to be able to alternatively rigidly lock cuff 3 to shell 2 so to prevent any pivoting movement of cuff 3 with respect to shell 2; and to completely unlock/release cuff 3 from shell 2 so as to allow cuff 3 to freely pivot, preferably both forwards and backwards, on the shell about axis A.

Additionally, the cuff locking device 10 is also structured so as to

- automatically lock cuff 3 to shell 2 so as to prevent any pivoting movement of cuff 3 on shell 2, when heel 5 of shell 2 is connected/coupled to the heel-piece of the ski binding

device, or better the mountaineering ski binding device; and preferably also

- automatically unlock/release cuff 3 from shell 2 so as to allow cuff 3 to pivot freely about axis A, when heel 5 of shell 2 is disconnected/released/separated from the heel-piece of the ski binding device, or better the mountaineering ski binding device.

In other words, the cuff locking device 10 is structured so as to be able to automatically lock cuff 3 in rigid manner to shell 2 as a result of coupling/insertion of heel 5 of shell 2 with the locking member of the heel-piece of a generic mountaineering ski binding device. Additionally, the cuff locking device 10 is preferably also structured so as to be able to automatically unlock/release cuff 3 from shell 2 as a result of the disconnection/release/separation of heel 5 of shell 2 from the locking member of the heel-piece of the mountaineering ski binding device.

More in detail, in the example shown, the ski boot 1 is preferably equipped with a rear coupling plate 12 which is fixed in a rigid manner on heel 5 of shell 2, substantially astride the centerline plane of the boot, and is specifically structured/shaped so as to be engaged in a rigid and stable, though easily releasable, manner by a pair of parallel side-by-side coupling pins

13, which stick out from the heel-piece of the Dynafit-type mountaineering ski binding device, thus remaining locally substantially parallel to the longitudinal axis of the ski on which the mountaineering ski binding device is located, so as to allow the heel-piece of the mountaineering ski binding device to couple to and lock/retain the heel 5 of shell 2 on the back of the downhill ski with the modes envisaged by international standards in force for mountaineering ski boots (currently international standard ISO-9523 and the dimensional specifications required for coupling to Dynafit-type mountaineering ski binding devices or the like).

The cuff locking device 10 is instead preferably structured so as to automatically

- lock cuff 3 in rigid manner to shell 2 as a result of the coupling/insertion of the two coupling pins 13 of the heel-piece inside the rear coupling plate 12, and preferably also
- unlock/release cuff 3 completely from shell 2 as a result of the extraction of the two coupling pins 13 of the heel-piece from the rear coupling plate 12.

Dynafit-type mountaineering ski binding devices are widely known in the field of mountaineering ski boots and are also described in detail, for example, in European Patent EP-0199098, and therefore will not be

further described.

Similarly, the rear coupling plate 12 is also a widely known component part in the field of mountaineering ski boots, and therefore will not be further described, except to clarify that the rear coupling plate 12 is preferably made of metal material, and is preferably fixed in a rigid manner to shell 2, or better to heel 5 of shell 2, by means of an anchoring screw.

With reference to figures 1, 2, 3 and 4, the cuff locking device 10 instead preferably comprises:

- a movable locking member 15 which is fixed in a rigid manner to shell 2 in the area above the heel of the boot, and is able to move towards and away from a coupling position in which the movable locking member 15 is able to couple in a rigid and stable, though easily removable, manner to cuff 3 while remaining rigidly integral with shell 2, so as to selectively lock cuff 3 in a rigid manner to shell 2; and
- a command assembly 16 which is structured so as to be able to automatically move and maintain the movable locking member of cuff 15 in the coupling position while heel 5 of the boot is coupled to the heel-piece of the

mountaineering ski binding device.

More in detail, the locking member 15 is preferably movable between a coupling position in which the movable locking member 15 is able to connect cuff 3 in a rigid and stable, though easily removable, manner to shell 2, so as to prevent the cuff 3 from pivoting with respect to shell 2; and a released position in which the movable locking member 15 allows the cuff 3 to pivot freely with respect to shell 2. The command assembly 16 is instead structured so as to be able to automatically shift and maintain the movable locking member 15 in the coupling position while the two coupling pins 13 of the heel-piece of the mountaineering ski binding device engage with/are fitted into the rear coupling plate 12.

With reference to figures 2, 3 and 4, in the example shown, in particular, the movable locking member 15 is preferably fixed in rigid manner on shell 2 in the area above the heel of the boot, so as to at least partly extend inside the gap 17 between shell 2 and cuff 3, and is able to move or to be elastically deformed towards cuff 3 while remaining rigidly integral with shell 2, so as to be able to selectively couple to cuff 3 in a rigid and stable, though easily releasable, manner, so as to lock cuff 3 to shell 2.

More in detail, in the example shown, the movable locking member 15 preferably comprises a flexible oblong

blade 18 which, in the area above the heel of the boot, extends substantially grazing the external surface of shell 2 and preferably also substantially coplanar to the centerline plane of the boot, so that at least a part of blade 18 extends inside gap 17 between shell 2 and cuff 3, and is fixed/coupled to shell 2 at the two ends so as to be able to bend freely towards cuff 3 while remaining rigidly integral with shell 2; and a coupling tooth 19 which sticks out from blade 18 towards cuff 3 so as to be able to couple to the body of cuff 3 when blade 18 bends towards cuff 3.

Blade 18 has an elastically flexible structure so that it can return in an elastic manner to the original configuration, i.e. not bent, as soon as possible; whereas the coupling tooth 19 is structured so as to lock in a rigid and stable, though easily releasable, manner the cuff 3 to blade 8, thus preventing any pivoting of cuff 3 with respect to shell 2, about axis A.

The command assembly 16 is instead preferably structured so as to induce/cause blade 18 to bend towards cuff 3 while heel 5 is coupled to the heel-piece of the mountaineering ski binding device.

In the example shown, in particular, the flexible oblong blade 18 is preferably made of a metal material, and has the lower end hinged directly on shell 2,

substantially at the heel of the boot. The upper end of blade 18 is instead substantially U-shaped, and is fitted astride the upper edge of shell 2, underneath cuff 3, to allow blade 18 to bend freely towards cuff 3 while remaining integral with shell 2.

The coupling tooth 19 instead sticks out from the portion of blade 18 located inside the gap 17 between shell 2 and cuff 3, towards the cuff 3 so as to be able to fit/stick into a locking seat 19a specifically made in the body of cuff 3 when blade 18 bends towards cuff 3, and is shaped so as to prevent any relative movement between cuff 3 and blade 18 while it engages/meshes in the locking seat 19a. Obviously the locking seat 19a is arranged in the portion of cuff 3 located on the centerline plane of the boot, immediately above the heel of the boot.

With reference to figures 2, 3 and 4, the command assembly 16 preferably comprises a rigid vertical strut 20 which extends substantially coplanar with the centerline plane of the boot, from heel 5 of shell 2 up to reach the movable locking member 15, preferably while remaining substantially grazing the external surface of shell 2, and is fixed on the body of shell 2 with the capability of freely sliding/moving in vertical direction between a lowered position and a raised position.

Alternatively, the rigid strut 20 may also be partly or completely inserted in sliding manner inside a groove or vertical tunnel which extends inside shell 2 at the heel of the boot, substantially coplanar to the centerline plane of the boot.

The lower end 20a of strut 20 is located substantially at heel 5, and is structured so as to be moved/pushed upwards following to the coupling of heel 5 to the heel-piece of the mountaineering ski binding device, so as to move strut 20 from the lowered position to the raised position, and to keep the strut 20 in the raised position while the heel-piece is coupled to heel 5. The upper end 20b of strut 20 is instead located at the movable locking member 15, and is structured so as to be able to selectively move/arrange the movable locking member 15 in its coupling position as a result of the movement and of the staying of strut 20 in the raised position.

More in detail, in the example shown, the lower end 20a of strut 20 is arranged substantially at the coupling plate 12, and is preferably structured so as to be moved/pushed upwards by the two coupling pins 13 of the heel-piece which fit into/penetrate the coupling plate 12, so as to move the strut 20 from the lowered position to the raised position as a consequence of the coupling/insertion of the two coupling pins 13 of the

heel-piece in the rear coupling plate 12, and to keep the strut 20 in the raised position while the two coupling pins 13 of the heel-piece engage the rear coupling plate 12.

In other words, command assembly 16 is preferably structured so as to induce/cause blade 18 to bend towards cuff 3 while the two coupling pins 13 of the heel-piece of the mountaineering ski binding device are fitted into the rear coupling plate 12.

With reference to figures 2, 3 and 4, in the example shown, in particular, the command assembly 16 of blade 18 preferably comprises a rigid vertical strut 20 which extends substantially coplanar with the centerline plane of the boot, from heel 5 of shell 2 up to reaching blade 18, preferably remaining substantially grazing the external surface of shell 2, and is fixed on the body of shell 2 with the capability of freely sliding/moving in vertical direction between a lowered position and a raised position.

The lower end 20a of strut 20 is arranged substantially below the coupling plate 12, and is structured so as to be moved/pushed upwards by the two coupling pins 13 of the heel-piece which couple/ penetrate the coupling plate 12, so as to move strut 20 from the lowered position to the raised position as a consequence of the coupling/insertion of the two

coupling pins 13 of the heel-piece in the rear coupling plate 12, and to keep the strut 20 in the raised position while the two coupling pins 13 of the heel-piece engage the rear coupling plate 12. The upper end 20b of strut 20 is instead arranged below blade 18, preferably more or less at the height of the coupling tooth 19, and is structured so as to be able to push/move away the middle part of blade 18 from the external surface of shell 2 as a consequence of the movement and of the staying of strut 20 in the raised position, so as to induce blade 18 to bend towards cuff 3.

More in detail, with reference to figures 2, 3, and 4, in the example shown the upper end 20b of strut 20 is preferably equipped with a wedge-shaped head 21 which, when strut 20 is in the raised position, is adapted to come in contact with a lifting ramp 22 arranged immediately below blade 18, more or less at the height of coupling tooth 19, and is shaped so as to force the entire upper end 20b of strut 20 to lift up/move away from the external surface of shell 2, thus forcing the immediately overhanging blade 18 to bend towards cuff 3.

With reference to figures 2 and 4, the lower end 20a of strut 20 is instead preferably, though not necessarily, fastened/connected to an intermediate lifting mechanism 23 which is preferably recessed inside heel 5 of shell 2 behind the rear coupling plate 12, and

is structured to be able to push the strut 20, or better the lower end 20a of strut 20, upwards following the coupling of the two coupling pins 13 with the rear coupling plate 12.

More in detail, in the example shown, the lower end 20a of strut 20 is coupled to a movable cursor 24 which in turn is slidingly fastened on the back of the coupling plate 12, so as to be recessed/enclosed inside heel 5 of shell 2 with the possibility of freely moving/displacing in vertical direction inside heel 5.

In addition to the movable cursor 24, the lifting mechanism 23 of the command assembly 16 also comprises a pair of lobed cams 25 which are fixed in rotatable manner on the back of the rear coupling plate 12, on opposite sides of the movable cursor 24, and are shaped so as to rest on the sides of the movable cursor 24. The two lobed cams 25 are furthermore profiled so as to push the movable cursor 24 upwards when they are rotated towards each other, and are arranged on the rear coupling plate 12, behind the two seats or grooves which are engaged by the two coupling pins 13 of the heel-piece, so as to be moved/rotated against each other by the two coupling pins 13 which are fitted into the rear coupling plate 12.

Operation of ski boot 1 is easily inferable from the above description, and therefore does not require

further explanations.

However, with regards to the cuff locking device 10, the insertion/coupling of the two coupling pins 13 of the heel-piece in the rear coupling plate 12 induces the upwards movement of strut 20 which, in turn, induces blade 18 to bend towards cuff 3 and the subsequent rigid locking of cuff 3 on shell 2.

Due to the elastically flexible structure, blade 18 tends to elastically return to the original configuration, i.e. in the non-bent position, therefore it exercises a downward push on strut 20 which tends to bring strut 20 back to the lowered position, but the presence of the two coupling pins 13 inside the rear coupling plate 12 prevents strut 20 from returning to the lowered position.

When the two coupling pins 13 of the heel-piece leave/abandon the rear coupling plate 12, the strut 20 immediately returns to the lowered position under the push of blade 18, thus allowing blade 18 to straighten. The return of blade 18 to the initial position moves the coupling tooth 19 away from the locking seat 19a, thus leaving cuff 3 free to pivot with respect to shell 2.

In other words, the insertion/coupling of the two coupling pins 13 of the heel-piece in the rear coupling plate 12 causes the upwards movement of strut 20 which, in turn, causes the movement of the locking member of

cuff 15 from the released position to the coupled position.

The advantages resulting from the particular structure of the cuff locking device 10 are remarkable.

The cuff locking device 10 is capable of automatically switching, when the heel 5 of the boot is coupled to the heel-piece of the ski binding device, from the configuration in which it unblocks/releases cuff 3 completely from shell 2 so as to allow cuff 3 to pivot freely on the shell, to the configuration in which it locks cuff 3 rigidly to shell 2 to prevent any pivoting movement of cuff 3 with respect to shell 2, thus preventing any intervention by the user.

Finally, it is clear that modifications and variants may be made to the above-described mountaineering ski boot 1 without without, however, departing from the scope of the present invention.

For example, the ski boot 1 could be structured for practising the sports of Telemark skiing or Freeriding.

With regards instead to the automatic cuff locking device 10, with reference to figure 5, in a second embodiment the movable locking member 15 of cuff locking device 10 comprises: a flexible oblong blade 28 which, in the area above the heel of the boot, extends substantially grazing the external surface of shell 2 and preferably also substantially coplanar to the

centerline plane of the boot, so that at least a part of blade 28 extends inside the gap 17 between shell 2 and cuff 3, and is fixed/locked rigidly on shell 2 at the lower end thereof so as to allow the body of blade 28 to flex freely for moving the upper end of blade 28 towards cuff 3, thus remaining rigidly integral with shell 2; and a coupling tooth 29 which sticks out from the upper end of blade 28 towards cuff 3, blade 28 being inside gap 17 between shell 2 and cuff 3, so as to be able to couple to the body of cuff 3 when blade 28 flexes towards cuff 3.

Similarly to the first embodiment, blade 28 has an elastically flexible structure so as to be able to return in an elastic manner to the original configuration as soon as possible; while the coupling tooth 29 is structured so as to be able to fit/stick into a locking seat 29a specifically made in the body of cuff 3 when blade 28 bends towards cuff 3, and is shaped so as to prevent any relative movement between cuff 3 and blade 28 while it engages/meshes in the locking seat 29a.

The wedge-shaped head 21 located on the upper end 20b of strut 20 is positioned so as to abut on the body of blade 28, when strut 20 is in the raised position, and is shaped so as to force blade 28 to bend towards cuff 3, thus bringing the upper end of blade 28 behind

cuff 3 and the coupling tooth 29 inside the locking seat 29a.

With reference to figure 6, in a third embodiment of the cuff locking device 10, the movable locking member 15 may instead consist of a substantially L-shaped rocker-arm ratchet 38 which lies on the centerline plane of the boot so that the lower segment 38a of the ratchet is locally substantially perpendicular to the external surface of shell 2, and so that the upper segment 38b of the ratchet extends substantially grazing the external surface of shell 2 up to penetrating inside gap 17 between shell 2 and cuff 3.

The end of the lower segment 38a of the rocker-arm ratchet 38 is also hinged to shell 2 at a predetermined distance from the external surface of shell 2, so that the entire rocker-arm ratchet 38 can pivot freely with respect to shell 2 thus remaining on the centerline plane of the boot; while the end of the upper segment 38b of the rocker-arm ratchet 38 is equipped with a coupling tooth 39 which is structured so as to couple in a rigid and stable, though easily releasable, manner to the body of cuff 3.

The bend of the rocker-arm ratchet 38 is instead pivotally jointed on the upper end 20b of strut 20 so that the movement of strut 20 from the lowered positioned to the raised position causes a rotation of

the rocker-arm ratchet 38 from the resting position in which the upper segment 38b of ratchet 38 is arranged substantially grazing the external surface of shell 2 so as to prevent the coupling tooth 39 to reach the body of cuff 3, to a coupling position in which the upper segment 38b of ratchet 38 is lifted/moved away from the external surface of shell 2 so as to allow the coupling tooth 39 to couple with the body of cuff 3.

With reference to figure 6, in this embodiment the command assembly 16 preferably also comprises a leaf spring 40 or other elastic element which is preferably located on the centerline plane of the boot, astride strut 20 and the upper segment 38b of ratchet 38, and is capable of retaining the rocker-arm ratchet 38 in the resting position in which the upper segment 38b of ratchet 38 is arranged substantially grazing the external surface of shell 2 so as to prevent the coupling tooth 39 from reaching and coupling to the body of cuff 3.

With reference to figure 7, in a fourth embodiment of the ski boot 1, heel 5 of shell 2 doesn't have the rear coupling plate 12, and is instead equipped with two upper coupling seats 42 which are located/obtained on the upper face or edge of heel 5, on opposite sides of the centerline plane of the boot and preferably in specular position with respect to the plane itself, and

are specifically structured/dimensioned to be engaged in a rigid and stable, though easily releasable, manner by the two prongs or tines 43 of the upper jaw of the heel-piece of a TR2-type mountaineering ski binding device, so as to allow the heel-piece of the mountaineering ski binding device to couple to and lock/retain heel 5 of shell 2 on the back of the downhill ski with the modes envisaged by international standards in force for mountaineering ski boots (currently international standard ISO-9523).

TR2-type mountaineering ski binding devices are widely known in the field of mountaineering ski boots and are also described in detail, for example, in European Patent EP-2384653 filed by company Ski Trab S.r.l., and therefore will not be further described.

The cuff locking device 10 is instead preferably structured so as to automatically

- lock cuff 3 in a rigid manner to shell 2 as a consequence of the insertion of the two prongs 43 of the heel-piece inside the specific coupling seats 42 present on the upper face or edge of heel 5, and preferably also
- unlock/release cuff 3 completely from shell 2 as a consequence of the extraction of the two prongs 43 of the heel-piece from the two coupling seats 42 present on the upper face or

edge of heel 5.

More in detail, in this embodiment, the lifting mechanism 23 of command assembly 16 is recessed inside the heel 5 of shell 2, and is structured so as to push strut 20 upwards as a result of the insertion of the two prongs 43 of the heel-piece inside the two coupling seats 42 present on the face or upper edge of heel 5.

With reference to figure 7, in the example shown, in particular, the lower end 20a of strut 20 is coupled to a movable cursor 44 which is inserted in a vertically sliding manner inside hell 5, and has a tapered lower end. In addition to the movable cursor 44, the lifting mechanism 23 of command assembly 16 also comprises a pair of lifting wedges 45 which are arranged inside heel 5, on opposite sides of the movable cursor 24 and with the possibility of moving horizontally towards the movable cursor 24 inside heel 5. The tilted sides of movable cursor 44 rest on the two lifting wedges 45 and the lifting wedges 45 are profiled so as to push the movable cursor 44 upwards when they are pushed towards the movable cursor 44.

Finally, the lifting mechanism 23 comprises a movable member 46 which is recessed inside heel 5 behind lifting wedges 45, with the capability of moving vertically inside shell 5 between a raised position and a lowered position, and is structured so as to move into

the lowered position under the push of the two prongs 43 of the heel-piece which engage the two coupling seats 42 present on the face or upper edge of heel 5.

When located in the raised position, the movable member 46 arranges the two lifting wedges 45 at the maximum distance possible from the movable cursor 44, so as to move/induce the lowering of the movable cursor 44. When instead located in the lowered position, the movable member 46 arranges the two lifting wedges 45 at the minimum distance possible from the movable cursor 44, so as to induce the lifting of movable cursor 44.

Finally, in a further more sophisticated and not-shown embodiment, command assembly 16 may also comprise a helical spring or other similar elastic element, which is structured so as to retain in elastic manner the strut 20 in the lowered position.

More in detail, the helical spring or other similar elastic element is preferably interposed between shell 2 and strut 20 so as to elastically hinder any movement of strut 20 from the lowered position, and is preferably, though not necessarily, located in a recess obtained in shell 2, underneath strut 20, so as to be covered by the body of strut 20.

C L A I M S

1. Ski boot (1) comprising a rigid shell (2) which is shaped so as to accommodate the foot of the user, and a rigid cuff (3) which is shaped so as to surround the ankle of the user and is pivotally jointed on the shell (2) so as to be able to rotate about a reference axis (A) locally substantially coincident with the articulation axis of the ankle of the user; the shell (2) being provided with a rear heel (5) which is structured so to be able to connect/couple in a rigid and stable, though easily releasable, manner to the heel-piece of a ski binding device; the boot (1) being also provided with a cuff locking device (10) which is structured so as to be able to alternatively block the cuff (3) rigidly to the shell (2) for preventing any pivoting movement of the cuff (3) on the shell (2), and release the cuff (3) from the shell (2) so to allow the cuff (3) to pivot freely about said reference axis (A);

the ski boot (1) being **characterized in that** the cuff locking device (10) is structured so as to be able to automatically lock the cuff (3) to the shell (2) to prevent any pivoting movement of the cuff (3) on the shell (2), as a result of connection/coupling of the heel (5) of the boot to the heel-piece (13, 43) of the ski binding device.

2. Ski boot according to Claim 1, characterized in that the cuff locking device (10) is also structured so as to be

able to automatically unlock/release the cuff (3) from the shell (2) as a result of disconnection/release/separation of the heel (5) of the boot (2) from the heel-piece (13, 43) of the ski binding device.

3. Ski boot according to Claim 1 or 2, characterized in that the cuff locking device (10) comprises: a movable locking member (15) which is fixed to the shell (2) in the area above the heel of the boot, and is able to move towards and away from a coupling position in which the movable locking member (15) is able to couple in a rigid and stable, though easily removable, manner to the cuff (3) while remaining rigidly integral with the shell (2); and a command assembly (16) which is structured so as to be able to automatically move and maintain the movable locking member (15) in the coupling position while the heel (5) of the boot is coupled to the heel-piece (13, 43).

4. Ski boot according to Claim 3, characterized in that the movable locking member (15) is fixed in rigid manner on the shell (2) in the area above the heel of the boot, so as to at least partly extend inside the gap (17) between the shell (2) and the cuff (3), and is able to move or to elastically deform towards the cuff (3) while remaining rigidly integral with the shell (2), so as to be able to selectively couple with the cuff (3) in a rigid and stable, though easily releasable, manner.

5. Ski boot according to Claim 3 or 4, characterized in that the command assembly (16) comprises a rigid vertical strut (20) which extends substantially coplanar with the centerline plane of the boot, from the heel (5) up to reach the movable locking member (15), and is fastened on the body of the shell (2) with the capability of freely sliding /moving in vertical direction between a lowered position and a raised position; the lower end (20a) of the strut (20) being positioned at the heel (5), and being structured so as to be moved/pushed upwards by the heel-piece (13, 43) coupling with the heel (5) of the boot.

6. Ski boot according to Claim 5, characterized in that the command assembly (16) also comprises a lifting mechanism (23) which is recessed inside the heel (5), and is structured so to push upwards the lower end (20a) of the strut (20), as a consequence of the connection of the heel-piece (13, 43) with the heel (5) of the boot.

7. Ski boot according to Claim 5 or 6, characterized in that the upper end (20b) of the strut (20) is positioned at the movable locking member (15), and is structured so as to be able to selectively move/position the movable locking member (15) in its coupling position as a result of the movement and/or of the stay of the strut (20) in the raised position.

8. Ski boot according to Claim 5, 6 or 7, characterized

in that the rigid strut (20) extends substantially grazing the external surface of the shell (2).

9. Ski boot according to any one of Claims 3 to 8, characterized in that the movable locking member (15) comprises: a flexible oblong blade (18) which, in the area above the heel of the boot, extends substantially grazing the external surface of the shell (2) so that at least a part of the blade (18) extends inside the gap (17) between the shell (2) and the cuff (3), and is fixed/coupled to the shell (2) at the two ends so to be able to bend freely towards the cuff (3) while remaining rigidly integral with the shell (2); and a coupling tooth (19) which sticks out from the blade (18) towards the cuff (3) so to be able to couple with the body of the cuff (3) when the blade (18) bends towards the cuff (3).

10. Ski boot according to any one of Claims 3 to 8, characterized in that the movable locking member (15) comprises: a flexible oblong blade (18) which, in the area above the heel of the boot, extends substantially grazing the external surface of the shell (2) so that at least a part of the blade (18) extends inside the gap (17) between the shell (2) and the cuff (3), and is fixed/locked on the shell (2) at the lower end thereof so as to allow the body of the blade (28) to flex freely for moving the upper end of the blade (28) towards the cuff (3); and a coupling

tooth (29) which sticks out from the upper end of the blade (28) towards the cuff (3) so to be able to couple with the body of the cuff (3) when the blade (28) flexes towards the cuff (3)

11. Ski boot according to Claim 9 or 10, characterized in that the flexible oblong blade (18, 28) is substantially coplanar with the centerline plane of the boot.

12. Ski boot according to Claim 9, 10 or 11, characterized in that the command assembly (16) is structured so as to induce/cause the bending or flexing of the blade (18, 28) towards the cuff (3) until the heel-piece (13, 43) of the ski binding device is coupled with the heel (5) of the boot.

13. Ski boot according to any one of the preceding claims, characterized by being provided with a rear coupling plate (12) which is fixed in a rigid manner on the heel (5) of the shell (2) and is specifically structured/shaped so to be engaged in a rigid and stable, though easily releasable, manner by the coupling pins (13) of the heel-piece of a generic Dynafit-type or the like, mountaineering ski binding device; the cuff locking device (10) being structured so to be able to automatically lock the cuff (3) in a rigid manner to the shell (2) as a result of coupling/insertion of the coupling pins (13) of the heel-piece (13, 43) inside the rear coupling plate (12).

14. Ski boot according to Claim 13, characterized in that the cuff locking device (10) is structured so to be able to automatically unlock/release the cuff (3) completely from the shell (2) as a result of extraction of the coupling pins (13) of the heel-piece (13, 43) from the rear coupling plate (12).

15. Ski boot according to Claim 13 or 14, characterized in that the command assembly (16) of the cuff locking device (10) is structured so to be able to automatically shift and maintain the movable locking member (15) in the coupling position until the coupling pins (13) of the heel-piece engage with/are fitted into the rear coupling plate (12).

16. Ski boot according to any one of Claims 1 to 12, characterized by being provided with two coupling seats (42) which are realized/located on the upper face or edge of the heel (5), on opposite sides of the centerline plane of the boot, and are specifically structured/dimensioned for being engaged by the two prongs (43) of the jaw of the heel-piece of a generic TR2-type or the like, mountaineering ski binding device; the cuff locking device (10) being structured so as to be able to automatically lock the cuff (3) in a rigid manner to the shell (2) as a result of coupling/insertion of the two prongs (43) of the jaw of the heel-piece inside the coupling seats (42)

present on the heel (5) of the boot.

17. Ski boot according to Claim 16, characterized in that the cuff locking device (10) is structured so to also be able to automatically completely unlock/release the cuff (3) from the shell (2) as a result of extraction of the two prongs (43) of the heel-piece from the coupling seats (42) present on the heel (5) of the boot.

18. Ski boot according to Claim 16 or 17, characterized in that the command assembly (16) of the cuff locking device (10) is structured so as to be able to automatically move and maintain the movable locking member (15) in the coupling position while the prongs (43) of the jaw of the heel-piece engage with/are fitted into the coupling seats (42) present on the heel (5) of the boot.

19. Ski boot according to any one of Claims 5 to 18, characterized in that the command assembly (16) also comprises an elastic element which is structured so as to retain in elastic manner the strut (20) in the lowered position.

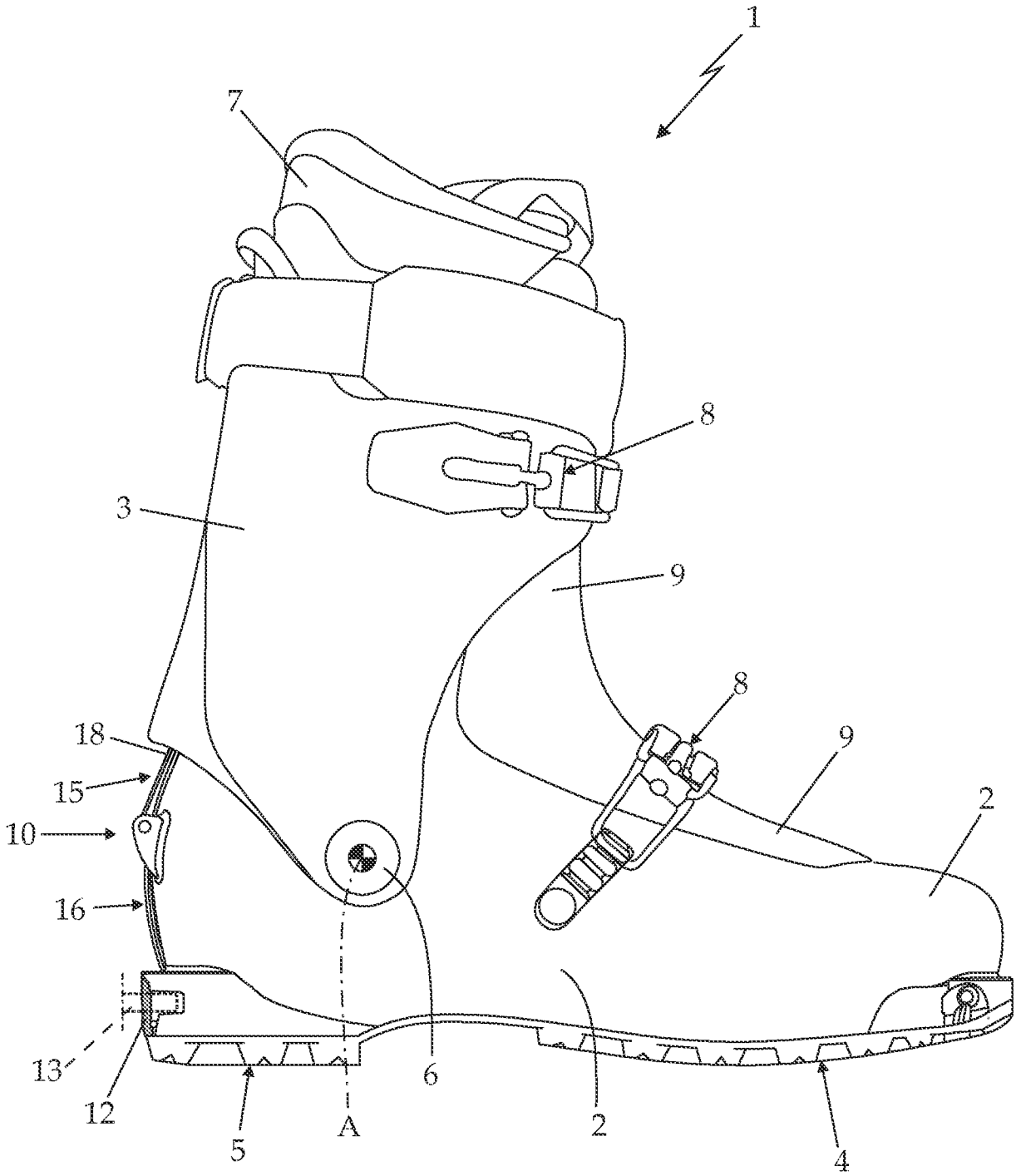


Fig. 1

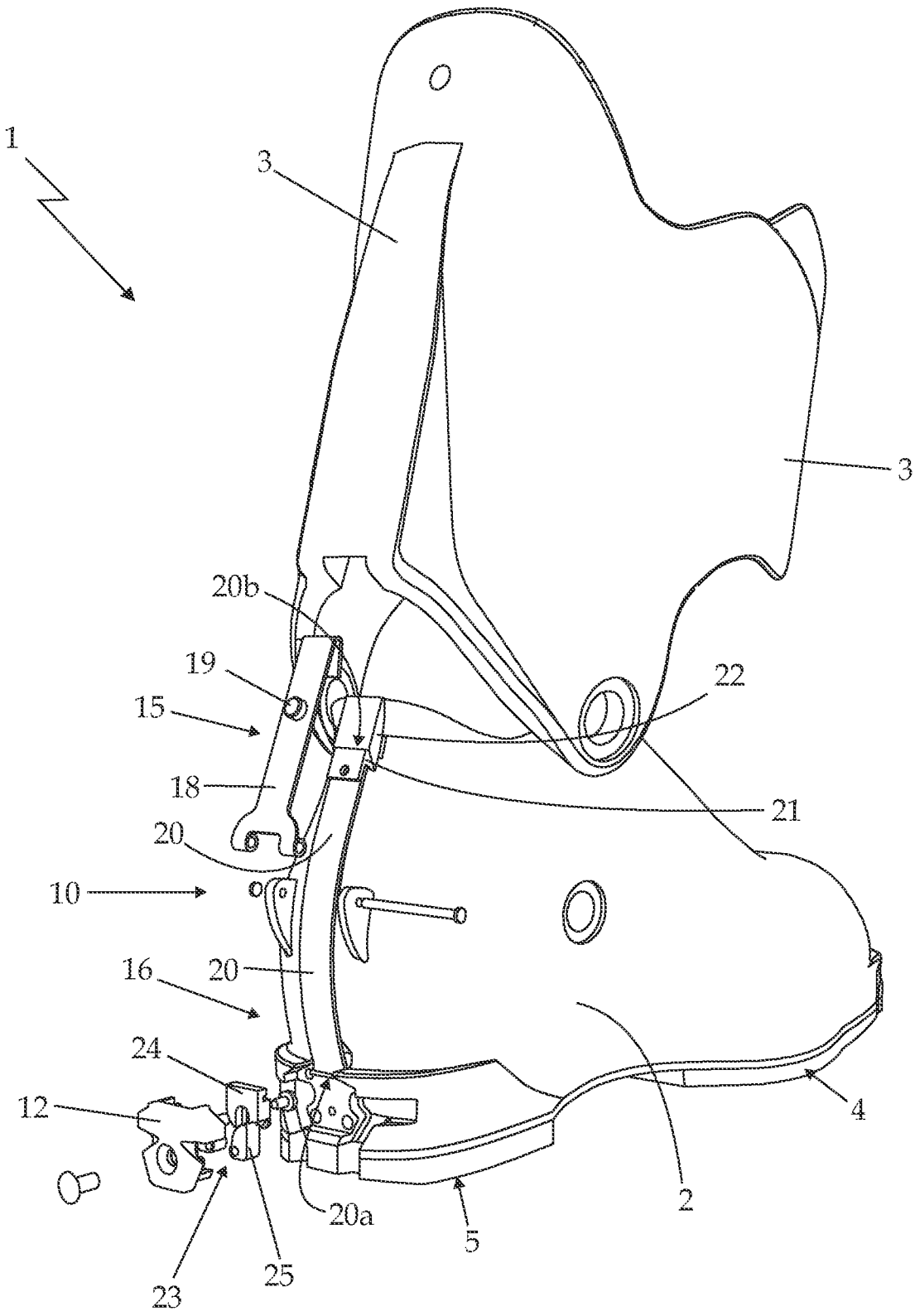


Fig. 2

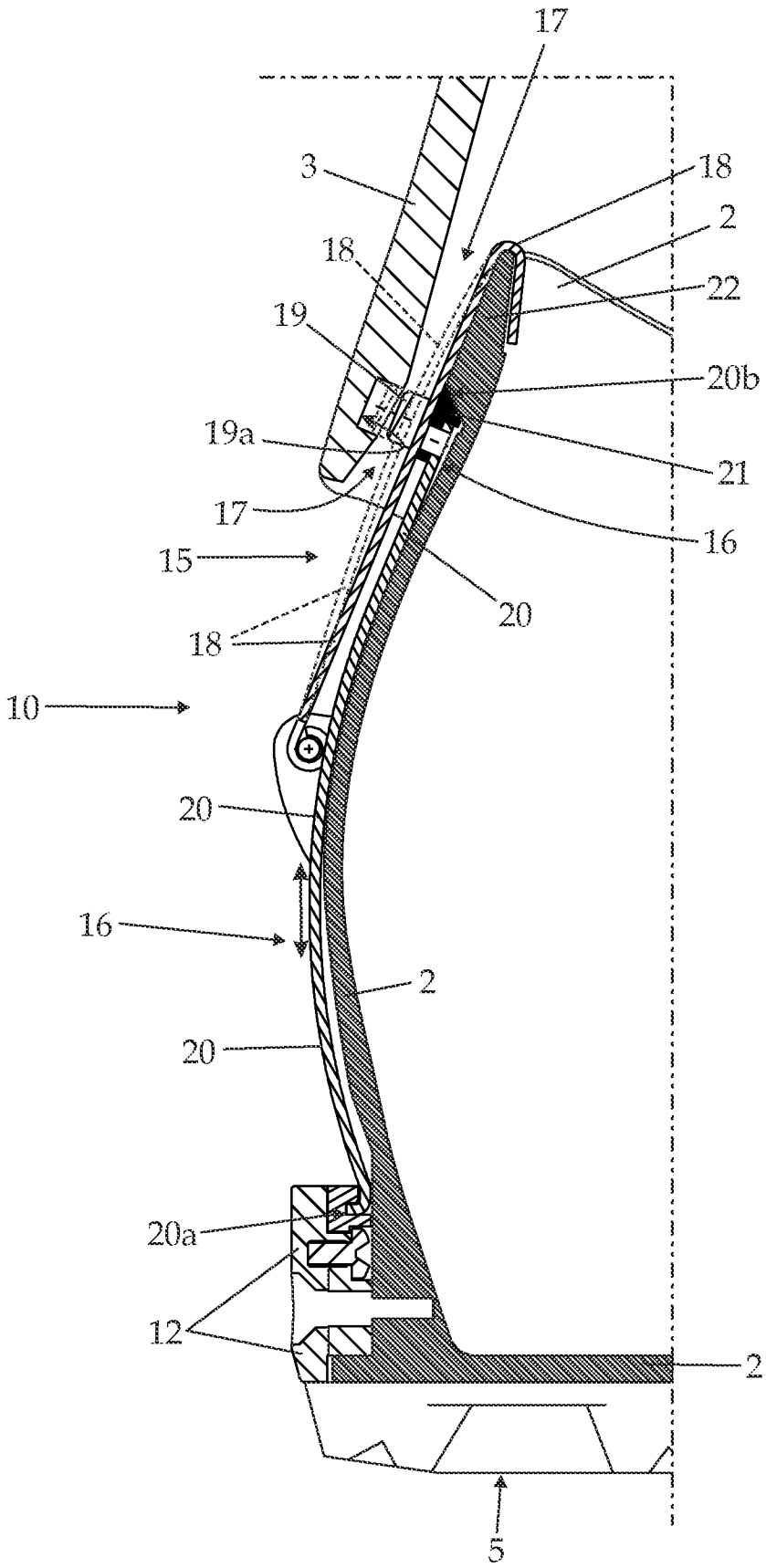


Fig. 3

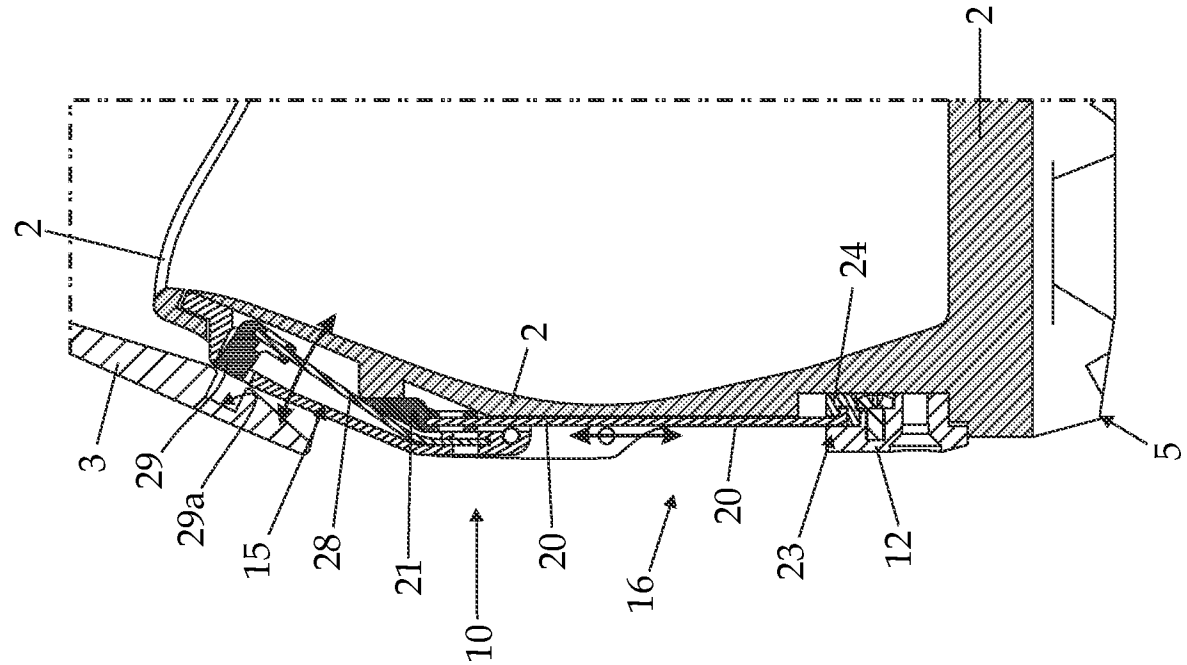

2
2
3
29
29a
15
28
21
10
20
2
16
20
24
23
12
5

Fig. 5

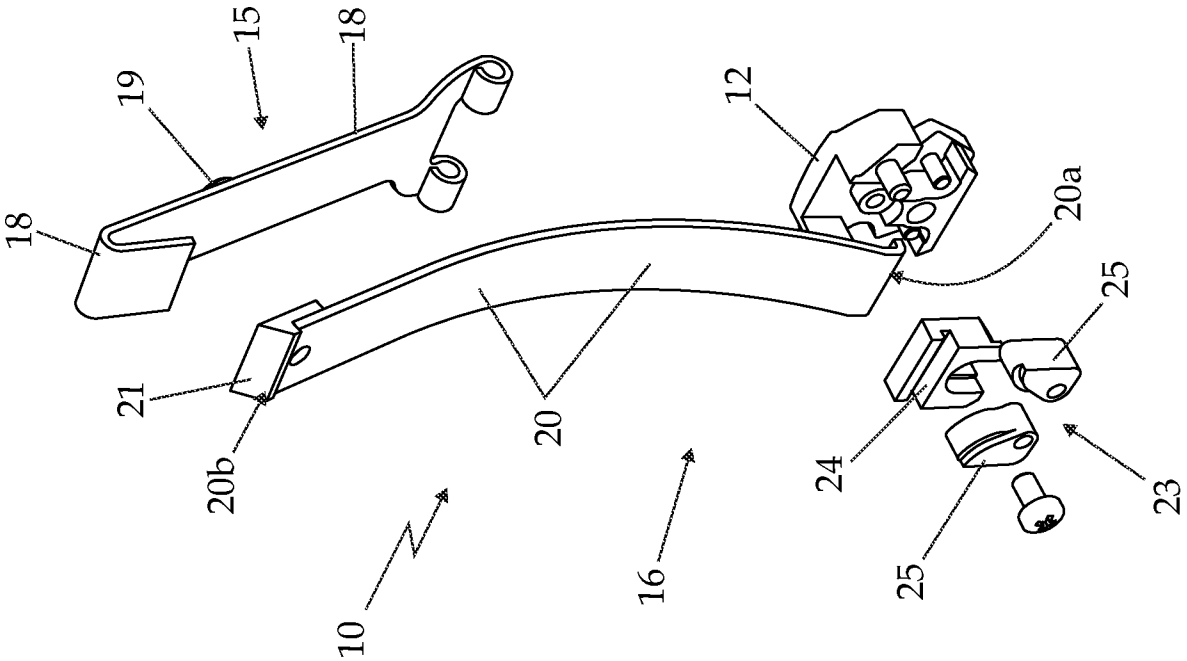

15
18
19
18
21
20b
10
20
16
12
20a
24
25
25
23

Fig. 4

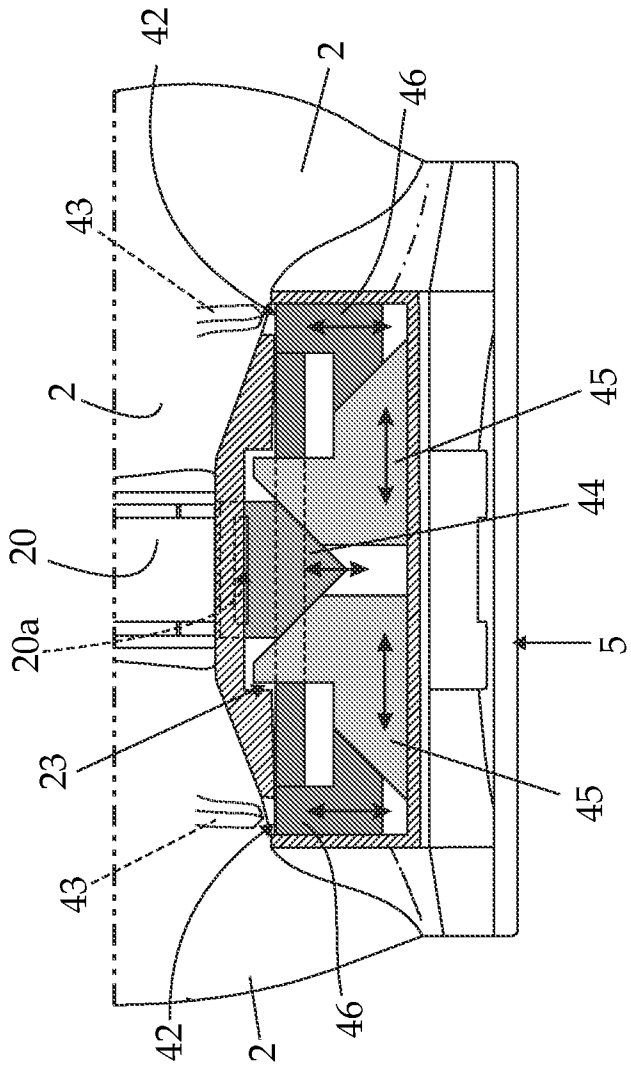

42
2
46
43
2
45
44
20
20a
5
23
45
43
42
2
46

Fig. 7

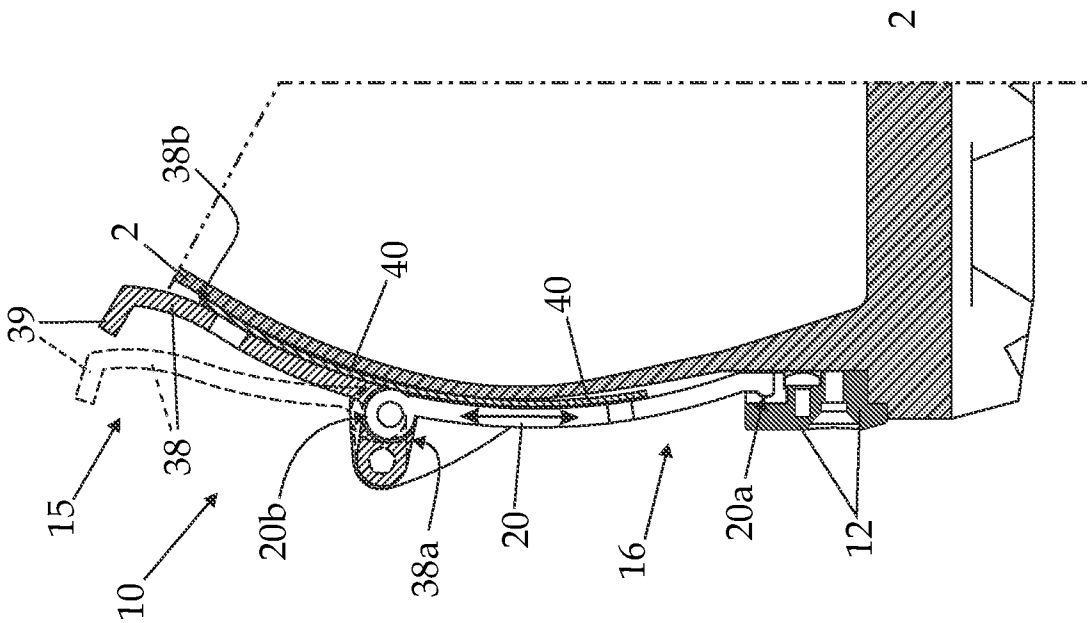

2
38b
2
39
40
40
38
15
20b
38a
20
16
20a
12
10
5

Fig. 6

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/059671

A. CLASSIFICATION OF SUBJECT MATTER
INV. A43B5/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A43B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 664 969 A2 (TYROLIA FREIZEITGERAETE [AT]) 2 August 1995 (1995-08-02) column 5, line 10 - column 6, line 20; figures 1,2	1-4, 13-18
X	EP 2 478 788 A1 (HEAD TECHNOLOGY GMBH [AT]) 25 July 2012 (2012-07-25) paragraph [0024] - paragraph [0042]; figures	1,2, 13-18
X	EP 1 366 684 A1 (TECNOLOGICA S P A [IT]) 3 December 2003 (2003-12-03) the whole document	1-4, 13-18
X	EP 1 226 768 A1 (SALOMON SA [FR]) 31 July 2002 (2002-07-31) the whole document	1,2, 13-18

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 April 2014	15/04/2014

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Cianci, Sabino

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2013/059671

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0664969 A2	02-08-1995	AT 401710 B	25-11-1996
		EP 0664969 A2	02-08-1995
EP 2478788 A1	25-07-2012	EP 2478788 A1	25-07-2012
		US 2012186108 A1	26-07-2012
EP 1366684 A1	03-12-2003	EP 1366684 A1	03-12-2003
		IT PN20020030 U1	01-12-2003
EP 1226768 A1	31-07-2002	EP 1226768 A1	31-07-2002
		FR 2819692 A1	26-07-2002
		IT MI20030102 U1	25-09-2003
		US 2002095822 A1	25-07-2002