



(11) **EP 4 570 108 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
18.06.2025 Bulletin 2025/25

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

(21) Application number: **24208783.1**

(52) Cooperative Patent Classification (CPC):
A43B 5/0454; A43B 5/0456

(22) Date of filing: **24.10.2024**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(72) Inventors:
• **GAZZOLA, Florio**
31040 GIAVERA DEL MONTELLO (TV) (IT)
• **GIROLIMETTO, Giovanni**
31040 GIAVERA DEL MONTELLO (TV) (IT)
• **ZANNIN, Alessandro**
31040 GIAVERA DEL MONTELLO (TV) (IT)

(30) Priority: **13.12.2023 IT 202300026604**

(74) Representative: **Robba, Pierpaolo**
Interpatent S.R.L.
Via Caboto, 35
10129 Torino (IT)

(71) Applicant: **Tecnica Group S.p.A.**
31040 Giavera del Montello (TV) (IT)

(54) **SPORTS FOOTWEAR COMPRISING A SHELL AND A CUFF ARTICULATED TO EACH OTHER**

(57) The present invention relates to a sports footwear (1) of the type comprising a shell (3) and a cuff (5) articulated to said shell. According to the invention, said sports footwear (1) comprises at its rear portion a system for controlling the flexion of said cuff (5) relative to said shell (3). Said flexion control system comprises an outer flexion control element (9) arranged externally to the rear wall of the sports footwear (1), and an inner flexion control element (17), arranged internally to the rear wall of the sports footwear. The outer flexion control element (9) comprises a first engagement element (15) and the inner flexion control element (17) comprises a second engagement element (21), said engagement elements being adapted to cooperate with each other. The engagement between the outer flexion control element (9) and the inner flexion control element (17) allows enhancing the effectiveness of the progression and control of the flexion of the cuff relative to the shell.

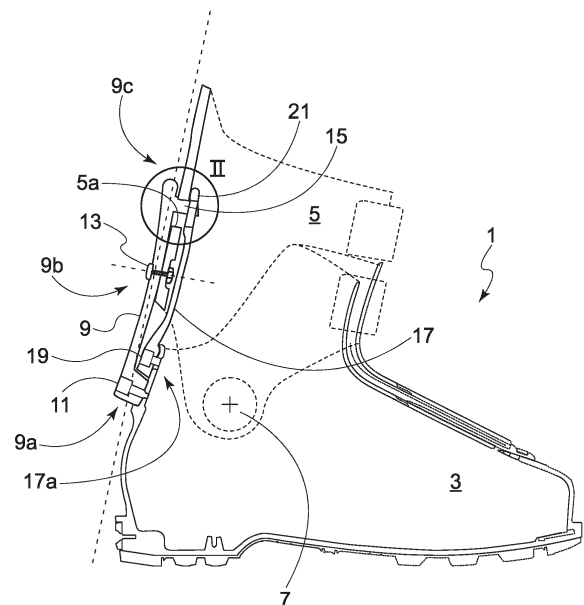


Fig. 1a

Description

Technical Field of the Invention

[0001] The present invention relates to a sports footwear of the type comprising a shell, made of a substantially rigid material, and a cuff, also made of a substantially rigid material and articulated to said shell.

[0002] More particularly, the present invention relates to a footwear of the above-mentioned type provided with an improved system for controlling flexion of the cuff relative to the shell.

[0003] The present invention finds application, for example, in the field of ski boots.

Prior Art

[0004] Sports footwear are known comprising an inner element made of a substantially soft material and an outer element made of a substantially rigid material.

[0005] A typical example of this kind of sports footwear are ski boots, which have an inner liner made of a substantially soft material and an outer shell made of a substantially rigid material.

[0006] In general, said sports footwear further comprise a cuff, adapted to receive the lower part of the user's leg, which cuff is also made of a substantially rigid material and is connected to the outer shell.

[0007] Said cuff is generally articulated to the shell (in particular at the malleolar region), in such a way as to allow a forward flexion of the user's leg during skiing.

[0008] More specifically, the adjustment of the flexion of the cuff relative to the shell significantly influences the performance of the sports footwear.

[0009] A ski boot with higher capability of flexing the cuff relative to the shell is more comfortable and suitable for skiing beginners. On the other hand, a ski boot with lower capability of flexing the cuff relative to the shell (i.e. a stiffer ski boot) ensures a better transmission of movements from the user's foot to the ski boot and from this to the ski, and is therefore suitable for expert skiers.

[0010] Besides the flexion degree of the cuff relative to the shell, the control of this flexion is also essential, which flexion must not be linear, but progressive to ensure good performances.

[0011] Generally, the flexion degree ("flex index") of the cuff relative to the shell is mainly determined by the plastic materials used for manufacturing the ski boot.

[0012] However, there are ski boots which include arrangements for varying said flex index of the cuff relative to the shell.

[0013] In general, these ski boots are provided at their rear portion with special screw systems that connect the cuff to the shell: the adjustment consists in changing the angle of the cuff relative to the shell, thus changing the angle between the user's leg and the user's foot, which determines the static bending of the ankle.

[0014] However, despite the possibility of modifying

the flex index of the cuff relative to the shell to a certain extent, ski boots of known type are not able to provide satisfactory control of the flexion of the cuff relative to the shell during skiing.

[0015] Document EP 3 738 458, in the name of the Applicant, discloses a sports footwear comprising a shell, made of a substantially rigid material, and a cuff, also made of a substantially rigid material and articulated to said shell, and further comprising a connecting element extending in a substantially vertical direction and connecting said shell to said cuff, said connecting element being rigidly constrained at its lower end to the shell and at its upper end to the cuff.

[0016] According to the disclosure of EP 3 738 458, said connecting element has the general shape of an elongated plate and, when viewed in a sectional view in a vertical plane parallel to the longitudinal axis of the sports footwear, has a sinuous shape, which confers a certain elasticity to said connecting element and enables said connecting element to transmit energy to the sports footwear and receive energy from it. Compared with other known systems for adjusting the flex index of the cuff relative to the shell based on screw systems, the thus shaped connecting element of the footwear according to the invention is much more versatile.

[0017] However, the system for controlling flexion of the cuff relative to the shell described in the aforementioned document is still open to improvement.

[0018] In particular, it is desirable to increase the ease of execution of the athletic gesture by the user, especially of the management of the flexion and return phase of the ski boot. Furthermore, it is desirable that operation of the system for controlling flexion of the cuff relative to the shell is not influenced by the change in behaviour that the plastic materials of which the cuff and shell are made undergo upon changes in temperature, so as to make the performance of the sports footwear constant and uniform.

[0019] The object of the present invention is therefore to provide a sports footwear which comprises a shell and a cuff articulated to each other and in which the control of the flexion of said cuff relative to said shell is improved.

[0020] This and other objects are achieved by the sports footwear as claimed in the appended claims.

Summary of the Invention

[0021] The sports footwear according to the invention comprises a shell, made of a substantially rigid material, and a cuff, also made of a substantially rigid material and articulated to said shell.

[0022] Said sports footwear comprises at its rear portion an outer flexion control element which extends in a substantially vertical direction and connects said shell to said cuff. Said outer flexion control element is arranged externally to the rear walls of shell and cuff and is connected at its lower end to the shell and at an intermediate portion thereof to the cuff.

[0023] According to the invention, the sports footwear comprises, at its rear portion, an inner flexion control element which extends in a substantially vertical direction, is connected at its lower to the shell and extends internally to the cuff wall.

[0024] Still according to the invention, said outer flexion control element comprises a first engagement element, said inner flexion control element comprises a second engagement element and the cuff wall is provided with an opening through which said first engagement element and said second engagement element can come into contact with each other and cooperate with each other.

[0025] During sports practice, the first engagement element and the second engagement element are constrained to each other and cannot be completely separated from each other, but they are free to move relative to each other.

[0026] In particular, they are free to move relative to each other in the vertical direction. More specifically, the outer flexion control element and the inner flexion control element are sized and arranged relative to each other in such a way that:

- in the unflexed state of the cuff relative to the shell, the first engagement element does not exert any load on the second engagement element; and
- in the flexed state of the cuff relative to the shell, a mating surface of the first engagement element abuts against a corresponding mating surface of the second engagement element, and the first engagement element exerts a load on the second engagement element, said load increasing as the flexion of the cuff relative to the shell increases.

[0027] It results from the above that in the unflexed state of the cuff relative to the shell, the outer flexion control element does not exert any load on the inner flexion control element, whereas in the flexed state of the cuff relative to the shell the outer flexion control element exerts, on the inner flexion control element, a load that increases as the flexion angle of the cuff relative to the shell increases.

[0028] According to a preferred embodiment of the invention, the first engagement element is made as a protruding tooth and the second engagement element is made as a slot. According to this embodiment, the upper face of the protruding tooth is the mating surface of the first engagement element and the upper edge of the slot is the mating surface of the second engagement element.

[0029] According to an alternative embodiment of the invention, the first engagement element is made as a slot and the second engagement element is made as a protruding tooth. According to this embodiment, the lower face of the protruding tooth is the mating surface of the second engagement element and the lower edge of the slot is the mating surface of the first engagement element.

[0030] According to a further alternative embodiment of the invention, the first engagement element is made as a first protruding tooth and the second engagement element is made as a second protruding tooth facing said first protruding tooth. According to this embodiment, the upper face of the first protruding tooth is the mating surface of the first engagement element and the lower face of the second protruding tooth is the mating surface of the second engagement element.

[0031] According to the teachings of EP 3 738 458, the outer flexion control element has the general shape of an elongated plate and, viewed in a sectional view in a vertical plane parallel to the longitudinal axis of the sports footwear, is not straight, but has a sinuous shape.

[0032] According to a preferred embodiment of the invention, the outer flexion control element is rigidly fastened at its lower end to the shell and is rigidly fastened at an intermediate portion thereof to the cuff.

[0033] According to an alternative embodiment of the invention, the outer flexion control element is rotatably connected at its lower end to the shell and is rigidly fastened at an intermediate portion thereof to the cuff.

[0034] According to a preferred embodiment of the invention, the inner flexion control element is rigidly fastened at its lower end to the shell.

[0035] According to an alternative embodiment of the invention, the inner flexion control element is rotatably connected at its lower end to the shell.

Brief Description of the Drawings

[0036] Further features and advantages of the invention will become more apparent from the following detailed description of a preferred embodiment of the invention, given by way of non-limiting example with reference to the attached drawings, in which:

Figure 1a schematically shows a section of a sports footwear according to the invention, in a first configuration;

Figure 1b schematically shows a section of a sports footwear according to the invention, in a second configuration;

Figure 2a shows, on an enlarged scale, detail II of Figure 1a, relating to the engagement between the outer flexion control element and the inner flexion control element;

Figure 2b shows, on an enlarged scale, detail II of Figure 1a, relating to the engagement between the outer flexion control element and the inner flexion control element;

Figure 3 schematically shows a section of a sports footwear according to an embodiment variant of the invention.

Description of Preferred Embodiments of the Invention

[0037] In the preferred embodiments of the invention

described here below, reference will be made to the application of the invention to a ski boot comprising a shell and a cuff articulated to each other.

[0038] Such application should not be considered in any way as limiting the scope of the invention and the invention can be applied to any sports footwear comprising a shell and a cuff articulated to each other, especially if it is deemed necessary or appropriate to control the flex index of the cuff relative to the shell.

[0039] With reference to the attached Figures 1a and 1b, a ski boot 1 is schematically shown. Said ski boot generally comprises an inner element or inner liner (not shown), made of a substantially soft material, and an outer shell 3, made of a substantially rigid material and configured to accommodate the user's foot.

[0040] Said ski boot 1 further comprises a cuff 5 adapted to accommodate the lower part of the user's leg. Said cuff 5 is articulated to the shell 3, in particular at a pair of pivoting points 7 arranged on the opposite sides of the shell 3, preferably at the area of the malleoli.

[0041] According to the invention, said ski boot comprises, at its rear portion, a system for controlling flexion of the cuff 5 relative to the shell 3 of the ski boot.

[0042] Said flexion control system comprises an outer flexion control element 9, which is arranged externally to the rear walls of shell 3 and cuff 5 and extends in a substantially vertical direction.

[0043] The outer flexion control element 9 has the general shape of an elongated plate and connects the shell 3 to the cuff 5.

[0044] In particular, said outer flexion control element 9 is connected at its lower end 9a to the shell 3 and at an intermediate portion thereof 9b to the cuff 5.

[0045] More particularly, in the shown embodiment, said outer flexion control element 9 is rigidly fastened at its lower end 9a to the shell 3 by means of one or more first fixing screws 11 and is also rigidly fastened at an intermediate portion thereof 9b to the cuff 5 by means of one or more second fixing screws 13.

[0046] The outer flexion control element 9, when viewed in a sectional view in a vertical plane parallel to the longitudinal axis of the ski boot 1, preferably has a sinuous profile, i.e. said outer flexion control element 9 comprises a plurality of sections joined to each other, which are alternately closer to the rear wall of said sports footwear and farther from said rear wall of said sports footwear.

[0047] Such sinuous profile confers elastic properties to the outer flexion control element 9. According to the invention, the outer flexion control element 9 is provided, at its upper end 9c or close thereto, with a first engagement element.

[0048] In the shown embodiment, said first engagement element is made as a protruding tooth 15 which penetrates a window 5a specially formed in the rear portion of the cuff 5. Still according to the invention, the flexion control system comprises an inner flexion control element 17 which is connected at its lower end 17a to the

shell 3.

[0049] More particularly, in the shown embodiment, said inner flexion control element 17 is rigidly fastened at its lower end 17a to the shell 3 by means of one or more fixing screws 19.

[0050] Said inner flexion control element 17 extends in a substantially vertical direction and is arranged internally to the rear wall of the cuff 5.

[0051] The upper portion of the inner flexion control element 17 is free, in particular it is not connected to the cuff 5.

[0052] In said upper portion of the inner flexion control element 17 there is provided a second engagement element, adapted to cooperate with the first engagement element of the outer flexion control element 9.

[0053] In the shown embodiment, said second engagement element is made as a slot 21 receiving the protruding tooth 15 of the outer flexion control element 9.

[0054] The protruding tooth 15 is permanently constrained inside the slot 21 during use of the ski boot 1, i.e. during sports practice said protruding tooth never protrudes from said slot.

[0055] However, the protruding tooth is free to move within said slot, in particular to move in the vertical direction within said slot.

[0056] In particular, the protruding tooth 15 and the slot 21 are sized so that said protruding tooth 15 assumes a first configuration of engagement with said slot 21 when the ski boot is in a first configuration in which the cuff 5 is not flexed relative to the shell 3 (Figure 1a), and a second configuration of engagement with said slot 21 when the ski boot is in second configuration in which the cuff 5 is flexed relative to the shell 3 (Figure 1b).

[0057] Referring also to Figure 2a, when the ski boot is in a first configuration, in which the cuff 5 is not flexed relative to the shell 3, the protruding tooth 15 of the outer flexion control element 9 does not contact the edges of the slot 21 of the inner flexion control element 17 or, alternatively, it contacts an edge of the slot 21 of the inner flexion control element 17 without exerting any load thereon.

[0058] Referring also to Figure 2b, when the ski boot is in a second configuration, in which the cuff 5 is flexed by an angle α relative to the shell 3, the upper face 15a of the protruding tooth 15 of the outer flexion control element 9 abuts against and exerts a load on the upper edge 21a of the slot 21 of the inner flexion control element 17. Consequently, the outer flexion control element 9 exerts on the inner flexion control element 17 a force F substantially oriented upwards.

[0059] The force F exerted by the outer flexion control element 9 on the inner flexion control element 17 as a result of the load exerted by the upper face 15a of the protruding tooth 15 on the upper edge 21a of the slot 21 increases as the flexion angle α increases.

[0060] It will be evident to the person skilled in the art that in alternative embodiments the first and second engagement elements could also have different shapes,

provided that the first engagement element has a mating surface suitable for abutting against and exerting a load on a corresponding mating surface of the second engagement element. The engagement between the outer flexion control element 9 and the inner flexion control element 17 and the consequent result that said flexion control elements work together, allow enhancing the effectiveness of the progression and control of the flexion of the cuff 5 relative to the shell 3.

[0061] In addition, thanks to the provision of the inner flexion control element 17, the shell 3 of the ski boot 1 can be made open at the top, which makes it possible to eliminate (or at least drastically reduce) the influence of external temperature and the resulting variation in the behaviour of the plastic materials constituting the ski boot on the performance of the flexion control system and therefore on the performance of said ski boot.

[0062] Turning now to Figure 3, a ski boot 1 according to an alternative embodiment of the invention is schematically shown.

[0063] The ski boot 1 and its flexion control system are substantially identical to those shown in Figures 1a and 1b.

[0064] This alternative embodiment differs from the previous one only in that the outer flexion control element 9, rather than being rigidly fastened to the shell 3, is rotatably connected at its lower end 9a to said shell 3 by means of one or more pivot pins 23. Similarly, the inner flexion control element 17, rather than being rigidly fastened to the shell 3, is rotatably connected at its lower end 17a to said shell 3 by means of one or more pivot pins 25.

[0065] It is clear that it would also be possible to envisage further alternative embodiments in which one of the flexion control elements is rigidly fastened to the shell 3 and the other flexion control element is rotatably connected to said shell.

[0066] It is evident that other modifications and variations within the reach of those skilled in the art can be made to the sports footwear and the flexion control system thereof without departing from the scope of protection as defined by the appended claims, the embodiments described and illustrated above having been provided solely by way of non-limiting examples.

[0067] Also, although the invention has been described with reference to a ski boot, it is also applicable to other types of sports footwear comprising a shell and a cuff articulated to each other, such as, for example, roller skates.

Claims

1. Sports footwear (1), comprising a shell (3), made of a substantially rigid material and shaped for accommodating the foot of a user, and a cuff (5), also made of a substantially rigid material and shaped for accommodating the lower part of the leg of said user, said cuff (5) being articulated to said shell (3) at one

or more pivoting points, said sports footwear comprising at its rear portion a system for controlling the flexion of said cuff relative to said shell, **characterized in that** said flexion control system includes an outer flexion control element (9), which is arranged externally to the rear walls of said shell (3) and said cuff (5), extends in a substantially vertical direction and is connected at its lower end (9a) to said shell (3) and at an intermediate portion (9b) thereof to said cuff (5), and an inner flexion control element (17), which is connected at its lower end (17a) to said shell (3), is arranged internally to the rear wall of said cuff (5) and extends in a substantially vertical direction, **and in that** said outer flexion control element (9) is provided, at its upper end (9c) or close thereto, with a first engagement element (15) provided with a mating surface (15a), and said inner flexion control element (17) is provided, at its upper portion, with a second engagement element (21) provided with a mating surface (21a), said mating surface (15a) of said first engagement element (15) being suitable for abutting against and exerting a load on said mating surface (21a) of said second engagement element (21).

2. Sports footwear (1) according to claim 1, wherein the load exerted by said mating surface (15a) of said first engagement element (15) on said mating surface (21a) of said second engagement element (21) is zero when said cuff (5) is not flexed relative to said shell (3) and increases as the flexion angle (α) of said cuff (5) relative to said shell (3) increases.

3. Sports footwear (1) according to claim 1 or 2, wherein said first engagement element is made as a protruding tooth (15), wherein said second engagement element is made as a slot (21), and wherein said protruding tooth penetrates a window (5a) obtained in the rear wall of said cuff (5) and is received in said slot, said protruding tooth (15) of said outer flexion control element (9) being permanently constrained inside said slot (21) of said inner flexion control element (17), but being mobile within said slot (21), more particularly in the vertical direction.

4. Sports footwear (1) according to claim 3, wherein the upper face (15a) of said protruding tooth (15) is the mating surface of said first engagement element and is suitable for abutting against and exerting a load on the upper edge (21a) of said slot (21), which is the mating surface of said second engagement element.

5. Sports footwear (1) according to claim 1 or 2, wherein said first engagement element is made as a slot, wherein said second engagement element is made as a protruding tooth, and wherein said protruding tooth penetrates a window obtained in the rear wall of said cuff and is received in said slot, said protruding

tooth of said inner flexion control element (17) being permanently constrained inside said slot of said outer flexion control element (9), but being mobile within said slot, more particularly in the vertical direction.

claims, wherein said sports footwear is a ski boot (1).

6. Sports footwear (1) according to claim 5, wherein the lower edge of said slot is the mating surface of said first engagement element and is suitable for abutting against and exerting a load on the lower face of said protruding tooth, which is the mating surface of said second engagement element.

5
10
7. Sports footwear (1) according to claim 1 or 2, wherein said first engagement element is made as a first protruding tooth, wherein said second engagement element is made as a second protruding tooth, facing said first protruding tooth, wherein said first and second protruding teeth penetrate a window obtained in the rear wall of said cuff for cooperating with each other, and wherein the upper face of said first protruding tooth, which is the mating surface of said first engagement element, is suitable for abutting against and exerting a load on the lower face of said second protruding tooth, which is the mating surface of said second engagement element.

15
20
25
8. Sports footwear (1) according to any of claims 1 to 7, wherein said outer flexion control element (9) is rigidly fastened at said lower end (9a) thereof to said shell (3) and is also rigidly fastened at said intermediate portion (9b) thereof to said cuff (5).

30
9. Sports footwear (1) according to any of claims 1 to 7, wherein said outer flexion control element (9) is rotatably connected at said lower end (9a) thereof to said shell (3) and is rigidly fastened at said intermediate portion (9b) thereof to said cuff (5).

35
10. Sports footwear (1) according to any of claims 1 to 9, wherein said inner flexion control element (17) is rigidly fastened at said lower end (17a) thereof to said shell (3).

40
11. Sports footwear (1) according to any of claims 1 to 9, wherein said inner flexion control element (17) is rotatably connected at said lower end (17a) thereof to said shell (3).

45
12. Sports footwear (1) according to any of claims 1 to 11, wherein said outer flexion control element (9), when viewed in a sectional view on a vertical plane parallel to the longitudinal axis of the sports footwear, has a sinuous profile, formed by a plurality of sections joined to each other, which are alternately closer to the rear wall of said sports footwear and farther from said rear wall of said sports footwear.

50
55
13. Sports footwear (1) according to any of the preceding

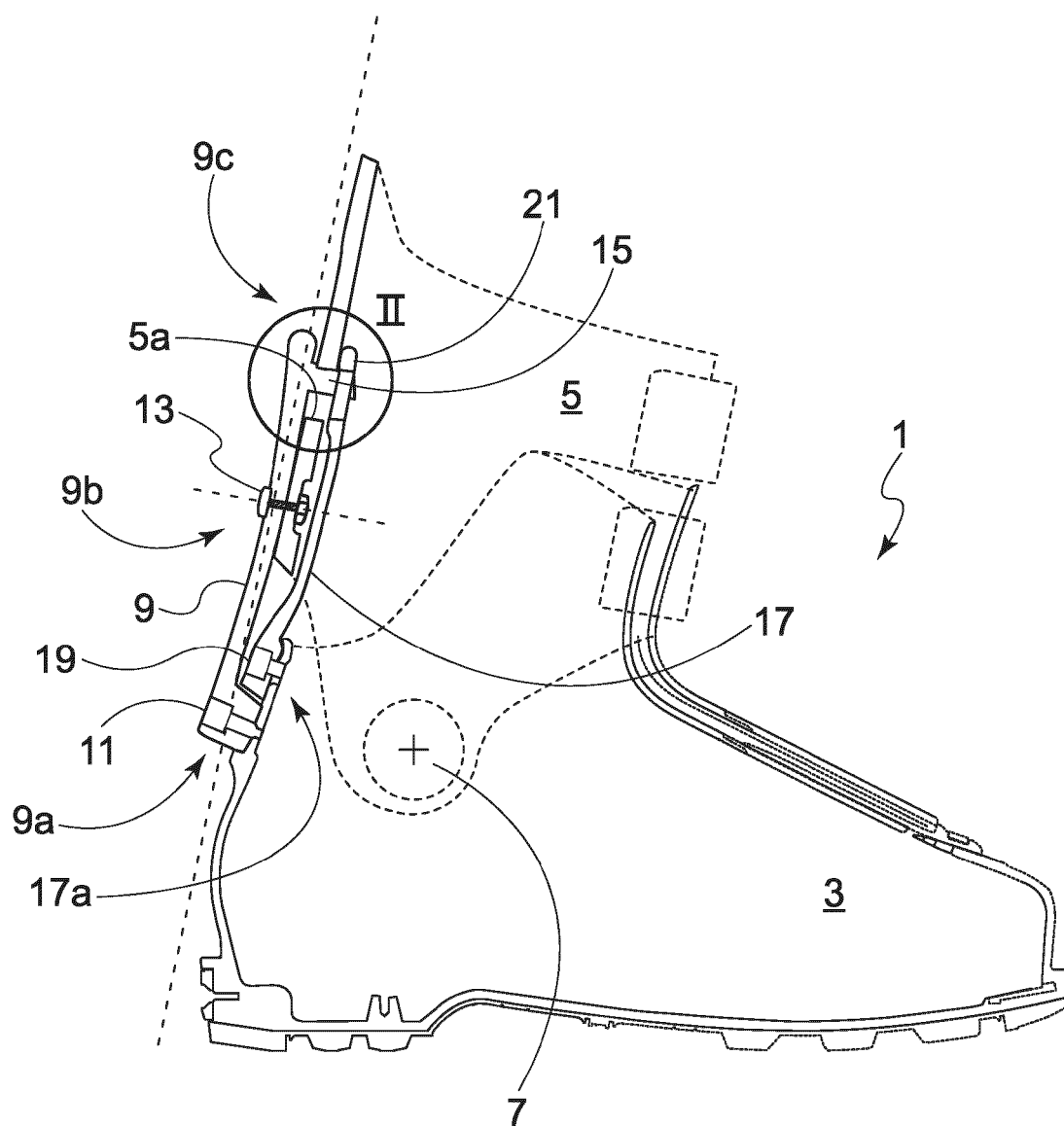


Fig. 1a

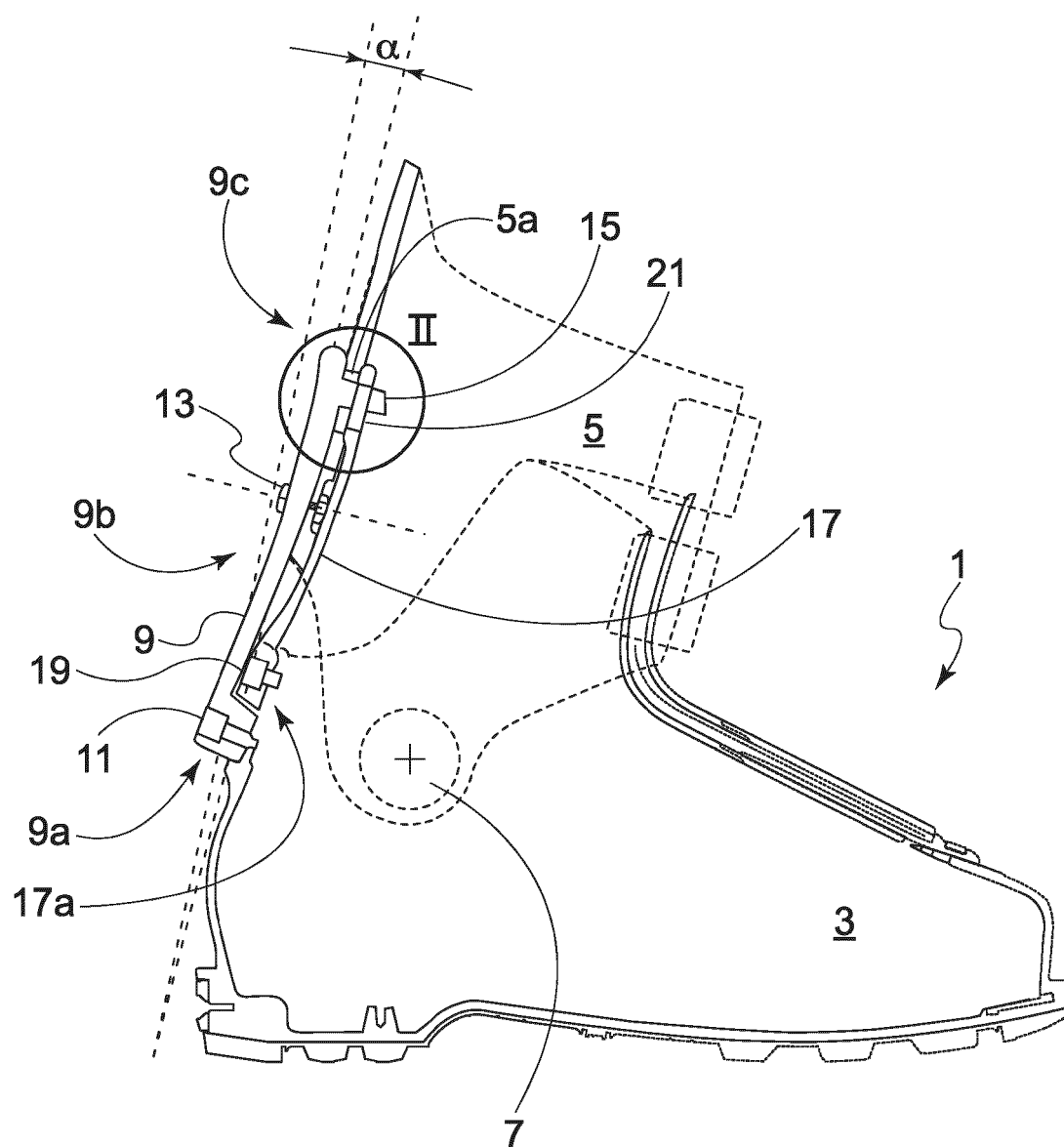


Fig. 1b

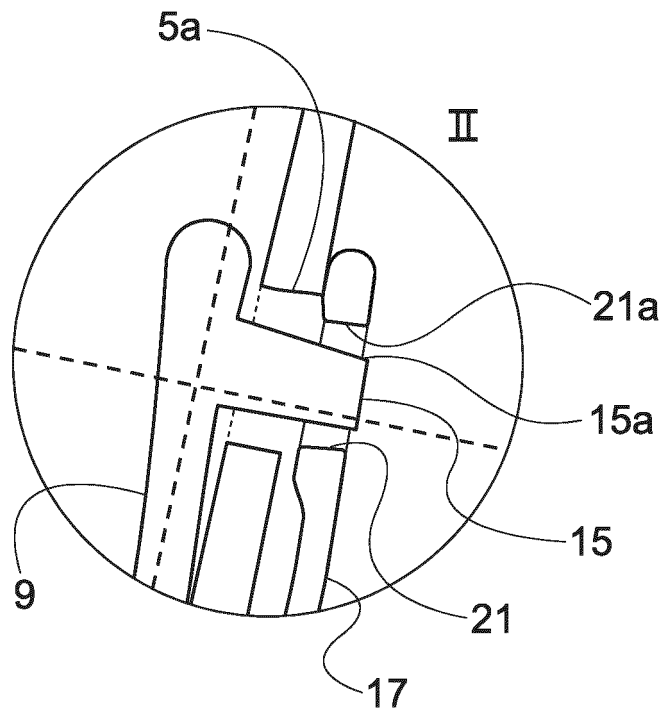


Fig. 2a

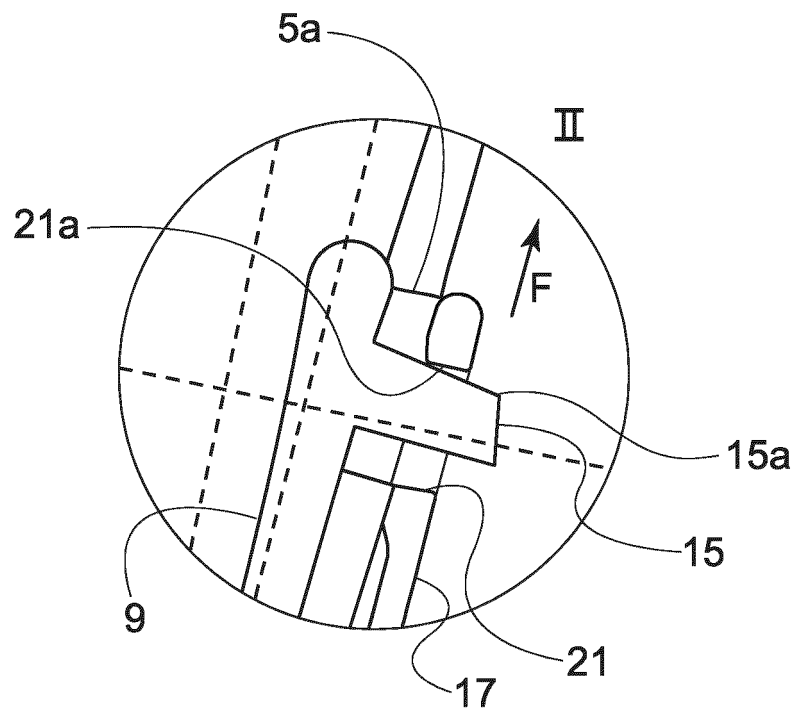


Fig. 2b

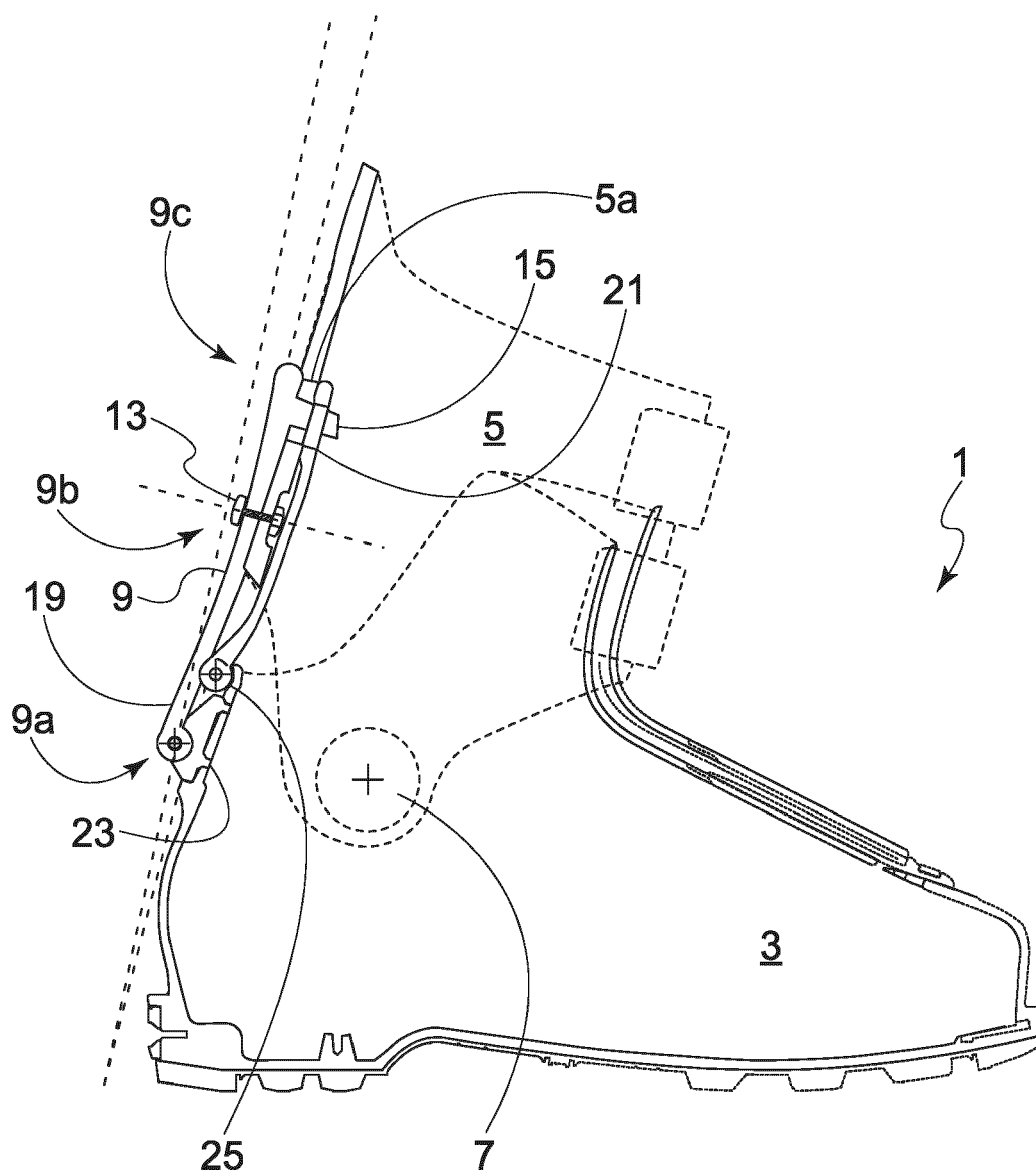


Fig. 3



EUROPEAN SEARCH REPORT

Application Number

EP 24 20 8783

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	US 2023/024907 A1 (GARBUJO GIUSEPPE [IT] ET AL) 26 January 2023 (2023-01-26) * paragraph [0046] - paragraph [0066] * * figures 1-11 *	1-13	INV. A43B5/04
A	IT 2018 0000 2544 A1 (TECNICA GROUP SPA) 9 August 2019 (2019-08-09) * page 7, line 29 - page 10, line 32 * * figures 1a-3b *	1-13	
			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		26 March 2025	Papatheofrastou, M
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 24 20 8783

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26 - 03 - 2025

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2023024907 A1	26-01-2023	NONE	
IT 201800002544 A1	09-08-2019		

15

20

25

30

35

40

45

50

55

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

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 3738458 A [0015] [0016] [0031]