(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 3 689 425 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
05.08.2020 Bulletin 2020/32

(51) Int Cl.:
A63C 9/086 *(2012.01)* ***A63C 9/08*** *(2012.01)*
A63C 9/22 *(2012.01)*

(21) Application number: **20151283.7**

(22) Date of filing: **10.01.2020**

(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 MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(30) Priority: **14.01.2019 IT 201900000547**

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(54) **A TOE-PIECE OF A SKI BINDING**

(57) A toe-piece of a ski binding (1) for ski mountaineering, comprising: a base (2) which is fixable to a ski; a second jaw (5) which rotatably couples with the base (2), and which is opposite the first jaw (3); a first pin (7) borne by the first jaw (3); a second pin (8) borne by the second jaw (5); an activating lever (10) rotatably coupled to the base (2) by means of a first rotating pivot (9) which crosses the activating lever (10) at a first through-hole (11); a joint (12); and a blocking lever (17) which is rotatably coupled to the activating lever (10). The first through-hole (11) is dimensioned so that an available volume (19) is defined between the first rotating pivot (9) and the internal walls of the first through-hole (11), so as to enable a movement of the activating lever (10) with respect to the first rotating pivot (9). The toe-piece of the ski binding (1) further comprises an adjusting element (20) which is arranged so as to interact with the available volume (19), and conformed so that the activation thereof determines an increase or a reduction of the available volume (19) so as to enable adjustment of the position that the activating lever (10) can assume and, therefore, the adjustment of the force with which the blocking lever (17) blocks the activating lever (10), when the ski binding toe-piece (1) is in the blocking configuration of the ski boot (B).

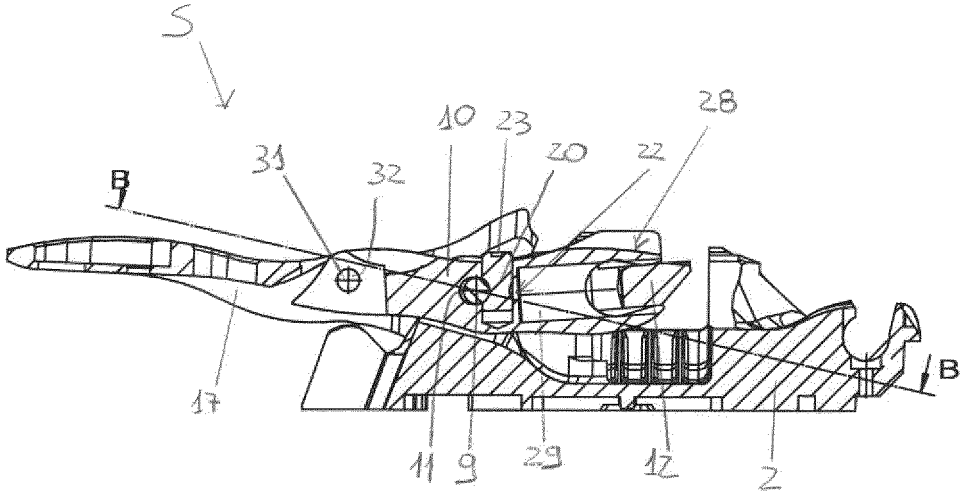


FIG. 1C

EP 3 689 425 A1

Description

[0001] The present invention relates to the technical sector of ski bindings, with particular reference to a toe-piece for a ski binding for ski mountaineering.

[0002] A known toe-piece of a ski binding for ski mountaineering is described in patent document EP2659940 and comprises: a base fixed to a ski; a first jaw and a second jaw arranged opposite one another, coupled rotatably to the base and which each bear a pin for inserting into a relative hole afforded in the tip of a ski boot; a joint borne by the activating lever, interposed between the first jaw and the second jaw and slidably coupled to the first jaw and the second jaw in order to allow sliding of the joint between a first position, a second position and a third position; first elastic means which are interposed between the joint and an activating lever so as to exert an elastic force having at least a component directed along the axis of the ski; and a blocking lever which is rotatably coupled to the activating lever and which comprises two abutting arms for abutting the joint.

[0003] A toe-piece of a ski binding of this type is configured so as to assume: a hooked configuration of the ski boot, for hooking the tip of a ski boot, wherein the two pins are distanced from one another by a first distance and in which the joint assumes the first position; an unhooked configuration of the ski boot, for unhooking the tip of a ski boot, which unhooked configuration of the ski boot is obtained starting from the hooked configuration of the ski boot by activating the activating lever in rotation, wherein the two pins are distanced from one another by a second distance, greater than the first distance, and wherein the joint assumes the second position; and a blocking configuration of the ski boot, for blocking the toe-piece of the ski binding in the hooked configuration of the ski boot, which blocking configuration of the ski boot is obtained starting from the hooked configuration of the ski boot by activating the blocking lever in rotation so that the abutting arms of the blocking lever abut the joint and block it in the third position.

[0004] The toe-piece of the ski binding is also designed so that starting from the hooked configuration of the ski boot, if subjected to a stress higher than a threshold value, the ski binding unhooks with a consequent passage of the toe-piece for the ski binding to the unhooked configuration of the ski boot. Therefore, during a descent, the ski boot can unhook, for example following an impact, thus safeguarding the skier from injury.

[0005] On the other hand, when uphill tracts are to be negotiated, or on the flat, it is preferable to shift the toe-piece of the ski binding into the blocking configuration of the ski boot, to avoid undesired unhooking of the ski boot.

[0006] However, it has been established that the reliability of the blocking decreases due to various factors such as: the wear on the toe-piece of the ski binding and/or of the ski boot, the production tolerances of the toe-piece of the ski binding and/or of the ski boot, up to the point where the blocking configuration of the ski boot might be ineffective. In other words, in this last configuration too, as in the hooked configuration of the ski boot, an impact that induces a torque that exceeds a threshold value can determine the undesired unhooking of the ski boot.

[0007] This drawback was obviated in relation to the toe-piece of the ski binding described in European patent EP2452731, which however is different to the toe-piece of a ski binding described in the foregoing, relative to EP2659940.

[0008] The aim of the present invention consists in obviating the above-mentioned drawback also for a toe-piece of a ski binding alike the one described in EP2659940.

[0009] The above aim is attained by means of toe-piece of a ski binding according to claim 1.

[0010] Specific embodiments of the invention will be described in the following part of the present description, according to what is included in the claims and with the aid of the appended tables of drawing, in which:

- figures 1A, 1B are respectively a view from above and a front view of a toe-piece of a ski binding according to the present invention, according to a first embodiment and in an unhooked configuration of the ski boot;
- figures 1C and 1D are respectively a view of section A-A of figure 1B and a view of section B-B of figure 1C;
- figures 2A, 2B are respectively a view from above and a front view of the toe-piece of a ski binding of figures 1A, 1B, in a hooked configuration of the ski boot;
- figures 2C and 2D are respectively a view of section A-A of figure 2B and a view of section B-B of figure 2C;
- figures 3A, 3B are respectively a view from above and a front view of the toe-piece of a ski binding of figures 1A, 1B, in a first blocking configuration of the ski boot;
- figures 3C, 3D, 3E, 3F are respectively a view of section A-A of figure 3B, a view of section B-B of figure 3C, a view of section C-C of figure 3B, and a view of section D-D of figure 3B;
- figures 4A, 4B are respectively a view from above and a front view of the toe-piece of a ski binding of figures 1A, 1B, in a second blocking configuration of the ski boot;
- figures 4C, 4D, 4E, 4F are respectively a view of section A-A of figure 4B, a view of section B-B of figure 4C, a view of section C-C of figure 4B, and a

view of section D-D of figure 4B;

- figures 5A, 5B are respectively a view from above and a front view of the toe-piece of a ski binding of figures 1A, 1B, in a third blocking configuration of the ski boot;

- figures 5C, 5D, 5E, 5F are respectively a view of section A-A of figure 5B, a view of section B-B of figure 5C, a view of section C-C of figure 5B, and a view of section D-D of figure 5B;

- figures 6A, 6B are respectively a view from above and a front view of a toe-piece of a ski binding according to the present invention, according to a second embodiment and in a first blocking configuration which is alike to the first blocking configuration of the first embodiment illustrated in figures 3A-3F;

- figures 6C, 6D, 6E, are respectively a view of section A-A of figure 6B, a view of section B-B of figure 6C, and a view of section C-C of figure 6B;

- figures 7A, 7B are the same type of views of figures 6C, 6E respectively, and illustrate a second blocking configuration of the second embodiment of the toe-piece of the ski binding which is alike to the second blocking configuration of the first embodiment illustrated in figures 4A-4F;

- figures 8A, 8B are the same type of views of figures 6C, 6E respectively, and illustrate a third blocking configuration of the second embodiment of the toe-piece of the ski binding which is alike to the third blocking configuration of the first embodiment illustrated in figures 5A-5F.

[0011] With reference to the appended figures, reference numeral (1) denotes in its entirety a toe-piece of a ski binding (1) for ski mountaineering, comprising: a base (2) which is fixable to a ski; a first jaw (3) which rotatably couples with the base (2); a second jaw (5) which rotatably couples with the base (2), and which is opposite the first jaw (3); a first pin (7) which is borne by the first jaw (3) for inserting in a first lateral hole made in a tip of a ski boot (not illustrated); a second pin (8) which is borne by the second jaw (5) for inserting in a second lateral hole opposite the first lateral hole made in the tip of the ski boot; a first rotating pivot (9) which is borne by the base (2); an activating lever (10) which comprises a first through-hole (11) which receives the first rotating pivot (9), so that the activating lever (10) is rotatably coupled to the base (2); a joint (12) borne by the activating lever (10), which is interposed between the first jaw (3) and the second jaw (4), and which is coupled to the first jaw (3) and to the second jaw (4) a blocking lever (17) which is rotatably coupled to the activating lever (10).

[0012] The toe-piece of the ski binding (1) is configured so as to assume: a hooked configuration of the ski boot (A) (see figures 2A-2D), in order to hook the tip of a ski boot, in which the first pin (7) and the second pin (8) are distanced from one another by a first distance; an unhooked configuration of the ski boot (A) (see figures 1A-1D), in order to unhook the tip of a ski boot, which unhooked configuration of the ski boot (S) is obtained starting from the hooked configuration of the ski boot (A) by activating the activating lever (10) in rotation, wherein the first pin (7) and the second pin (8) are distanced from one another by a second distance, greater than the first distance; and a blocking configuration (B) of the ski boot (see figures 3A-3F, 4A-4F, 5A-5F, 6A-6E, 7A-7B, 8A-8B), for blocking the toe-piece of the ski binding (1) in the hooked configuration of the ski boot (A), which blocking configuration of the ski boot (B) is obtained starting from the hooked configuration of the ski boot (A) by activating the blocking lever (17) in rotation so as to block the activating lever (10), the first pin (7) and the second pin (8) remaining distanced from one another by the first distance.

[0013] In the toe-piece of the ski binding (1), the first through-hole (11) is dimensioned so that an available volume (19) is defined between the first rotating pivot (9) and the internal walls of the first through-hole (11), so as to enable a movement of the activating lever (10) with respect to the first rotating pivot (9) (see figures 1C, 1D, 2C, 2D, 3C, 3D, 4C, 4D, 5C, 5D, 6C, 6D, 7A, 7B, 8A, 8B). The toe-piece of a ski attachment (1) further comprises an adjusting element (20) which is arranged so as to interact with the available volume (19), which is conformed so that the activation thereof determines an increase or a reduction of the available volume (19) so as to enable adjustment of the position that the activating lever (10) can assume and, therefore, the adjustment of the force with which the blocking lever (17) blocks the activating lever (10) (in particular compare figures 3E, 4E and 5E), when the ski binding toe-piece (1) is in the blocking configuration of the ski boot (B).

[0014] The possibility of adjusting the position that the activating lever (10) can assume advantageously enables compensating the wear on the toe-piece of the ski binding (1) and/or of the ski boot, as well as the production tolerances of the toe-piece of the ski binding (1) and/or of the ski boot, guaranteeing the reliability of the blocking of the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B).

[0015] With special reference to figures 1B, 2B, 3B, 4B, 5B and 6B, the first jaw (3) preferably rotatably couples to the base (2) according to a first axis of rotation (X1) which is preferably parallel to the axis of the ski, when the base (2) is fixed to the ski. Likewise, the second jaw (5) preferably couples rotatably to the base (2) according to a second axis of rotation (X2) which is preferably parallel to the axis of the ski, when the base (2) is fixed to the ski.

[0016] With particular reference to figures 1C, 1D, 2C, 2D, 3C, 3D, 3F, 4C, 4D, 4F, 5C, 5D, 5F, 6C, 6D, 6E, 7A,

7B, 8A, 8B, the adjusting element (20) is preferably borne by the activating lever (10) and is interposed between the joint (12) and the first rotating pivot (9), so that the adjusting element (20) presses against the first rotating pivot (9) when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B).

[0017] The activating lever (10) is preferably provided with a second hole (21) which intersects the first through-hole (11) and which is dimensioned to rotatably receive the adjusting element (20); the adjusting element (20) comprises a profiled portion (22) that enters into contact with the first rotating pivot (9) when the adjusting element (20) is inserted in the second hole (21) and at least when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B), so that the rotation of the adjusting element (20) determines the increase or reduction of the available volume (19).

[0018] Simply by rotating the adjusting element (20) it will advantageously and easily be possible to increase or reduce the available volume (19) and thus the blocking force acting on the activating lever (10), when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B). In fact, the profiled portion (22) of the adjusting element (20) is preferably conformed in such a way that, by activating the adjusting element (20) in rotation in the second hole (21) it will be possible to vary the part of the profiled portion (22) which is in contact with the first rotating pivot (9), consequently varying the available volume (19).

[0019] Further, and preferably, the adjusting element (20) comprises a manoeuvring portion (23) which exits from the second hole (21) to enable activating the adjusting element (20) in rotation. For example the manoeuvring portion (23) has a recess dimensioned to receive the end of a screwdriver.

[0020] In detail, in the embodiment illustrated in the accompanying figures (see figures 1C, 1D, 2C, 2D, 3C, 3D, 4C, 4D, 4C, 5D, 6C, 7A, 8A) the adjusting element (20) is a cylindrical element in which an undercut has been made to form the profiled portion (22).

[0021] An adjusting element (20) made in this way is advantageously simple to realise and assemble.

[0022] The profiled portion (22) of the adjusting element (20) can be a portion having a variable section along the axis of extension of the adjusting element (20), see figures 1D, 2D, 3D, 4D, 5D and 6D.

[0023] There follows a description of a first embodiment, illustrated in figures from 1A-1D to 5A-5F, in which: the first jaw (3) comprises a first guide (4); the second jaw (5) comprises a second guide (6); the joint (12) is slidably borne by the activating lever (10); the joint (12) comprises a first sliding element (13) which couples with the first guide (4) and a second sliding element (14) couples with the second guide (6), to enable sliding of the joint (12) with respect to the first jaw (3), to the second jaw (5) and to the activating lever (10) between a first position (FC1), a second position (FC2) and a third position (FC3); the toe-piece of the ski binding (1) comprises first elastic means (16) which are interposed between the joint (12) and the activating lever (10); the blocking lever (17) comprises an abutting portion (18) to abut the joint (12); when the toe-piece of the ski binding (1) is in the hooked configuration of the ski boot (A) the joint (12) assumes the first position (FC1); when the toe-piece of the ski binding (1) is in the unhooked configuration of the ski boot (S) the joint (12) assumes the second position (FC2); when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B) the abutting portion (18) of the blocking lever (17) abuts the joint (12) and blocks the joint (12) in the third position (FC3).

[0024] The joint (12) preferably has a truncoconical shape and comprises: a first wall (24); a second wall (25), opposite the first wall (24) and larger than the first wall (24); a third wall (26) which connects the first wall (24) and the second wall (25) and which bears the first sliding element (13); and a fourth wall (27) which is opposite the third wall (26), which connects the first wall (24) and the second wall (25) and which bears the second sliding element (14) (see figures 1A, 2A, 3A, 4A and 5A).

[0025] The third wall (26) preferably forms the first sliding element (13) and the fourth wall (27) forms the second sliding element (14).

[0026] With special reference to figures 1C, 2C, 3C, 3F, 4C, 4F, 5C and 5F, the joint (12) is preferably borne by the activating lever (10) at a first end (28) of the activating lever (10). The first end (28) of the activating lever (10) preferably has a C-shape to embrace the joint (12).

[0027] Further, the activating lever (10) preferably comprises a housing (29) for receiving the first elastic means (16), arranged between the first end (28) and the first through-hole (11) (see figures 1C, 2C, 3C, 3F, 4C, 4F, 5C and 5F).

[0028] In detail, with reference to figures 3F, 4F and 5F, the first elastic means (16) preferably comprise a spring (30) arranged in the housing (29) so that an end of the spring (30) presses against a wall of the housing (29), and thus against the activating lever (10), and the other end of the spring (30) presses against the joint (12).

[0029] With particular reference to figures 1C, 2C, 3C, 4C, 5C, preferably the toe-piece of the ski binding (1) comprises a second rotating pivot (31) borne by the blocking lever (17) which crosses the activating lever (10) so as to define the rotation coupling between the blocking lever (17) and the activating lever (10).

[0030] With special reference to figures 1C, 2C, 3C, 4C, 5C, the blocking lever (17) is preferably borne by the activating lever (10).

[0031] Further, and preferably, the abutting portion (18) of the blocking lever (17) comprises: a first abutting arm (33) having a first end wall (34) to abut the joint (12), when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B); and a second abutting arm (35), parallel and opposite the first abutting arm (33), having a second end wall (36) to abut the joint (12), when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B) (see figures 1A, 1D, 2A, 2D,

3A, 3D, 3E, 4A, 4D, 4E, 5A, 5D and 5E).

[0032] In detail, in the blocking configuration of the ski boot (B), the first end wall (34) and the second end wall (36) preferably abut respective portions of the second wall (25) of the joint (12), so as to block the joint (12) at the third position (FC3).

[0033] Further, with special reference to figures 1A, 1D, 2A, 2D, 3A, 3D, 4A, 4D, 5A and 5D, the first abutting arm (33) and the second abutting arm (34) are preferably arranged at opposite sides of the activating lever (10).

[0034] Further, the toe-piece of the ski binding (1) preferably comprises second elastic means (not illustrated) interposed between the blocking lever (17) and the activating lever (10) so as to induce a relative rotation with respect to the second rotating pivot (31). In detail, the second elastic means preferably comprise a torque spring arranged about the second rotating pivot (31) with an end of the torque spring acting on the activating lever (10) and the other end of the torque spring acting on the blocking lever (17).

[0035] Still more preferably, the blocking lever (17) comprises a grip (37) for enabling easy passage from one configuration to the other among the configurations that the toe-piece of the ski binding (1) can assume (see figures 1A, 1C, 2A, 2C, 3A, 2C, 4A, 4C, 5A and 5C).

[0036] With special reference to figures 1C, 1D, 2C, 2D, 3C, 3D, 3F, 4C, 4D, 4F, 4C, 5D and 5F, the transversal section of the first through-hole (11) is preferably shaped as a slot.

[0037] The adjusting element (20) is abutted, on one side, by the activating lever (10) via the relative internal wall of the first through-hole (11) and is abutted, on the other side, by the first rotating pivot (9). A reduction of the available volume (19) will determine the movement of the activating lever (10) and of the blocking lever (17) towards the joint (12), while an increase in the available volume (19) will determine the movement of the activating lever (10) and of the blocking lever (17) in a movement away from the joint (12).

[0038] The second hole (21) can be extended along a perpendicular direction to the extension direction of the first through-hole (11) (see figures 1C, 1D, 2C, 2D, 3C, 3D, 4C, 4D, 4C and 5D).

[0039] With reference to figures 1C, 2C, 3C, 4C, 5C, the activating lever (10) preferably further comprises a third through-hole (32) in order to receive the second rotating pivot (31).

[0040] The first elastic means (16) are preferably interposed between the joint (12) and the activating lever (10) so as to exert an elastic force having at least a component directed along the axis of the ski, when the base (2) is fixed to the ski; further, the first through-hole (11) is dimensioned so that the movement of the activating lever (10) and of the blocking lever (17) with respect to the first rotating pivot (9) is along a direction having at least a component that is parallel to the axis of the ski, when the base (2) is fixed to the ski.

[0041] With the expression "having at least a component directed along the axis of the ski, when the base (2) is fixed to the ski" it is meant that the elastic force and the movement of the activating lever (10) and of the blocking lever (17) with respect to the first rotating pivot (9) can be directed along a direction that is oblique to the axis of the ski, when the base (2) is fixed to the ski, as long as the direction has at least one component that is parallel to the axis of the ski, when the base (2) is fixed to the ski, or that the elastic force and the movement of the activating lever (10) and of the blocking lever (17) with respect to the first rotating pivot (9) can be parallel to the axis of the ski, when the base (2) is fixed to the ski.

[0042] The fact that the first through-hole (11) is advantageously such as to enable the movement of the activating lever (10) and of the blocking lever (17) with respect to the first rotating pivot (9) along a direction having at least a component that is parallel to the axis of the ski, when the base (2) is fixed to the ski, enables adjusting the force with which the abutting portion (18) of the blocking lever (17) presses against the joint (12) exploiting the action of the first elastic means (16) as with the toe-pieces of ski bindings of the prior art to which that solution refers, of which mention has already been made in the introductory part with reference to EP2659940. In this way, the toe-piece of the ski binding (1) of the invention can be made by making a small number of modifications to a known-type toe-piece of a ski binding, with evident advantages in terms of easy of construction and assembly, as well as costs.

[0043] The first guide (4) and the second guide (6) preferably extend to be convergent, so as: to block the joint (12) at the first position (FC1), when the toe-piece of the ski binding (1) assumes the hooked configuration of the ski boot (A) (see fig. 2A); to block the joint (12) at the second position (FC2) when the toe-piece of the ski binding (1) assumes the unhooked configuration of the ski boot (S) (see fig. 1A); to block the joint (12) at the third position (FC3), when the toe-piece of the ski binding (1) assumes the blocking configuration of the ski boot (B) (see figures 3A, 4A, and 5A).

[0044] In detail, the third position (FC3) can vary according to the position assumed by the adjusting element (20) in the second hole (21).

[0045] In other words, the first guide (4) and the second guide (6) are arranged facing one another and extend in a nearing way to one another towards the rear part of the ski (1), when the base (2) is fixed to the ski.

[0046] Likewise, the first sliding element (13) and the second sliding element (14) are opposite one another and extend in a nearing way to one another towards the rear part of the ski (1), when the base (2) is fixed to the ski.

[0047] In detail, see for example figure 1B, the first guide (4) comprises a first seat and the second guide (6) comprises a second seat destined to receive, respectively, the first sliding element (13) and the second sliding element (14), conformed in order to slide, respectively, in the first seat and the second seat, between the first position (FC1), the second position (FC2), and the third

position (FC3), in the passage from one use configuration of the toe-piece for the ski binding (1) to the other.

[0048] The toe-piece of the ski binding (1) preferably further comprises two idle rollers (not illustrated), borne by the base (2), and the blocking lever (17) comprises two rolling portions (not illustrated), arranged to roll on the idle rollers.

[0049] The presence of the idle rollers on which the rolling portions of the blocking lever (17) slide advantageously facilitates the movement of the blocking lever (17), borne by the activating lever (10) in the passage from one use configuration of the toe-piece for the ski binding (1) to the other.

[0050] There follows a description of the functioning of the toe-piece of the ski binding (1) of the present invention, according to the first embodiment.

[0051] Figures 1A to 1D illustrate the unhooked configuration of the ski boot (S), i.e. the configuration in which the toe-piece of the ski binding (1) is ready to receive a ski boot. In the unhooked configuration of the ski boot (S): in which the first pin (7) and the second pin (8) are distanced from one another by a second distance, which is such as to enable inserting a ski boot between them; the joint (12) is in the second position (FC2) in which it is raised with respect to the base (2) (see figure 1B) and consequently the activating lever (10) and the blocking lever (17) are arranged almost parallel to the base (2).

[0052] Figures 2A-2D illustrate the hooked configuration of the ski boot (A), reached starting from the unhooked configuration of the ski boot (S) after the skier has pressed the ski boot on the joint (12), so as to induce the lowering of the joint (12) and consequently the rotation of the first jaw (3) and the second jaw (5) about, respectively, the first axis of rotation (X1) and the second axis of rotation (X2) so that the first pin (7) and the second pin (8) reach the first distance, so as to retain the ski boot in the hooked position. In detail, the action of the ski boot on the joint (12) induces sliding of the first sliding element (13) and the second sliding element (14) along, respectively, the first guide (4) and the second guide (6), and thus the sliding of the joint (12) with respect to the first jaw (3), to the second jaw (5) and to the activating lever (10) at the first position (FC1), consequently inducing a smaller compression of the spring (30) against the housing (29) of the activating lever (10).

[0053] Figures 3A-3F, 4A-4F and 5A-5F illustrate the toe-piece of the ski binding (1) in respective blocking configurations of the ski boot (B1, B2, B3), obtained starting from the hooked configuration of the ski boot (A) by rotating the blocking lever (17) (in a clockwise direction, comparing figures 2C with figure 3C, or with figure 4C or figure 5C) until the abutting portion (18) of the blocking lever (17) is brought to abut the joint (12) so as to block the joint (12) in the third position (FC3). In detail, the three different configurations of the blocking of the ski boot (B1, B2, B3) differ from one another in the intensity of the force with which the abutting portion (18) of the blocking lever (17) presses against the joint (12) and for the position assumed by the joint (12) at the third position (FC3), which in this case varies on the variation of the position that the adjusting element (20) assumes in the second hole (21). In the present case, the blocking force increases from the first blocking configuration (figures 3A-3F) to the third blocking configuration (figures 5A-5F).

[0054] In other words, when the adjusting element (20) is activated in rotation in the second hole (21) to determine the increase of the force (from the first blocking configuration illustrated in figures 3A-3F to the third blocking configuration illustrated in figures 5A-5F) with which the abutting portion (18) of the blocking lever (17) presses against the joint (12), the joint (12) wedges more greatly against the first guide (4) and the second guide (6), assuming at the third position (FC3) a position progressively more displaced towards the rear part of the ski, when the base when the base (2) is fixed to the ski.

[0055] In particular, figures 3A-3F show a first blocking configuration of the ski boot (B1) wherein: the adjusting element (20) assumes, with respect to the second hole (21), a first angular position (P1) (see fig. 3D) in which it abuts the first rotating pivot (9). The available volume is the "free" volume that is defined between the first rotating pivot (9), the internal walls of the first through-hole (11) and the adjusting element (20). In this first blocking configuration of the ski boot (B1), the available volume is small with respect to the other two above-mentioned blocking configurations of the ski boot (B2, B3).

[0056] In particular, figures 4A-4F show a first blocking configuration of the ski boot (B2) wherein: the adjusting element (20) assumes, with respect to the second hole (21), a second angular position (P2) (see fig. 4D) in which it abuts the first rotating pivot (9). In this way the available volume (19) that is defined between the first rotating pivot (9), the internal walls of the first through-hole (11) and the adjusting element (20) is greater than the volume that is defined in the above-described first blocking configuration (B1), and the activating lever (10) performs a movement (if we consider starting from the first blocking configuration of the ski boot (B1)) towards the front part of the ski, when the when the base (2) is fixed to the ski, with a consequent reduction of the force which the abutting portion (18) presses against the joint (12).

[0057] Figures 5A-5F illustrate a further blocking configuration of the ski boot (B3), intermediate between the two blocking configuration of the ski boot (B1, B2) described in the foregoing, the adjusting element (20) assumes, with respect to the second hole (21), a third angular position (P3) (see fig. 5D) in which it abuts the first rotating pivot (9). In this way the available volume (19) that is defined between the first rotating pivot (9), the internal walls of the first through-hole (11) and the adjusting element (20) is intermediate with respect to the volume that is defined in the above-described other two blocking configurations of the ski boot (B1, B2), and the activating lever (10), subjected to the action of the spring (30) which pushes on the housing (29).

[0058] The passage from one to the other among the

various blocking configurations of the ski boot (B) can take place simply by activating the adjusting element (20) in the second hole (21) via the manoeuvring portion (23).

[0059] It is understood that the adjusting element (20) might assume, with respect to the second hole (21), a plurality of different angular positions such as to induce the toe-piece of the ski binding (1) to assume blocking configurations of the ski boot (B).

[0060] There follows a description of a second embodiment.

[0061] Figures 6A-6E illustrate the toe-piece of the ski binding (1) in a first blocking configuration which corresponds to the first blocking configuration (B1) already illustrated in figures 3A-3F but relative to the first embodiment.

[0062] In this second embodiment the toe-piece of the ski binding (1) is distinct due to the fact that: the first jaw (3) and the second jaw (5) do not comprise guides; the joint (12) is slidably constrained to the activating lever (10); the joint (12) does not comprise sliding elements; in this case the first elastic means (16) are interposed between a jaw (5) and the joint (12); in the first blocking configuration of the ski boot (B1) the abutting portion (18) of the blocking lever (17) does not abut the joint (12) but abuts the base (2).

[0063] Figures 7A, 7B illustrate the toe-piece of the ski binding (1) in a second blocking configuration (B2) which corresponds to the second blocking configuration (B2) illustrated in particular in figures 4V, 4F.

[0064] Figures 8A, 8B illustrate the toe-piece of the ski binding (1) in a third blocking configuration (B3) which corresponds to the third blocking configuration (B3) illustrated in particular in figures 5C, 5F.

[0065] For this second embodiment, the same considerations already made with reference to the first embodiment are valid.

[0066] It is understood that the foregoing has been described by way of non-limiting example, so that any constructional variants are to be taken to fall within the protective scope of the present technical solution, as claimed in the following.

Claims

1. A toe-piece of a ski binding (1) for ski mountaineering, comprising:

a base (2) which is fixable to a ski;
a first jaw (3) which rotatably couples with the base (2);
a second jaw (5) which rotatably couples with the base (2), and which is opposite the first jaw (3);
a first pin (7) which is borne by the first jaw (3) for inserting in a first lateral hole made in a tip of a ski boot;
a second pin (8) which is borne by the second jaw (5) for inserting in a second lateral hole opposite the first lateral hole made in the tip of the ski boot;
a first rotating pivot (9) which is borne by the base (2);
an activating lever (10) which comprises a first through-hole (11) which receives the first rotating pivot (9), so that the activating lever (10) is rotatably coupled to the base (2);
a joint (12) which is borne by the activating lever (10), which is interposed between the first jaw (3) and the second jaw (4), and which is coupled to the first jaw (3) and to the second jaw (4);
a blocking lever (17) which is rotatably coupled to the activating lever (10);
the toe-piece of the ski binding (1) being configured so as to assume: a hooked configuration of the ski boot (A), for hooking the tip of a ski boot, in which the first pin (7) and the second pin (8) are distanced from one another by a first distance; an unhooked configuration of the ski boot (S), for unhooking the tip of a ski boot, which unhooked configuration of the ski boot (S) is obtained starting from the hooked configuration of the ski boot (A) by activating the activating lever (10) in rotation, wherein the first pin (7) and the second pin (8) are distanced from one another by a second distance, greater than the first distance; and a blocking configuration (B) of the ski boot, for blocking the toe-piece of the ski binding (1) in the hooked configuration of the ski boot (A), which blocking configuration of the ski boot (B) is obtained starting from the hooked configuration of the ski boot (A) by activating the blocking lever (17) in rotation so as to block the activating lever, the first pin (7) and the second pin (8) remaining distanced from one another by the first distance;

characterised in that:

the first through-hole (11) is dimensioned so that an available volume (19) is defined between the first rotating pivot (9) and the internal walls of the first through-hole (11), so as to enable a movement of the activating lever (10) with respect to the first rotating pivot (9);
it comprises an adjusting element (20) which is arranged so as to interact with the available volume (19), which is conformed so that the activation thereof determines an increase or a reduction of the available volume (19) so as to enable adjustment of the position that the activating lever (10) can assume and, therefore, the adjustment of the force with which the blocking lever (17) blocks the activating lever (10), when the toe-piece of the ski binding (1) is in the

blocking configuration of the ski boot (B).

2. The toe-piece of a ski binding (1) of the preceding claim, wherein the adjusting element (20) is borne by the activating lever (10) and is interposed between the joint (12) and the first rotating pivot (9), so that the adjusting element (20) presses against the first rotating pivot (9) when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B).

3. The toe-piece of a ski binding (1) of any one of the preceding claims, wherein: the activating lever (10) is provided with a second hole (21) which intersects the first through-hole (11) and which is dimensioned to rotatably receive the adjusting element (20); the adjusting element (20) comprises a profiled portion (22) that enters into contact with the first rotating pivot (9) when the adjusting element (20) is inserted in the second hole (21) and at least when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B), so that the rotation of the adjusting element (20) determines the increase or reduction of the available volume (19).

4. The toe-piece of a ski binding (1) of the preceding claim, wherein the adjusting element (20) is a cylindrical element in which an undercut has been made to form the profiled portion (22).

5. The toe-piece of a ski binding of any one of the preceding claims, wherein: the first jaw (3) comprises a first guide (4); the second jaw (5) comprises a second guide (6); the joint (12) is slidably borne by the activating lever (10); the joint (12) comprises a first sliding element (13) which couples with the first guide (4) and a second sliding element (14) couples with the second guide (6), to enable sliding of the joint (12) with respect to the first jaw (3), to the second jaw (5) and to the activating lever (10) between a first position (FC1), a second position (FC2) and a third position (FC3); it comprises first elastic means (16) which are interposed between the joint (12) and the activating lever (10); the blocking lever (17) comprises an abutting portion (18) to abut the joint (12); when the toe-piece of the ski binding (1) is in the hooked configuration of the ski boot (A) the joint (12) assumes the first position (FC1); when the toe-piece of the ski binding (1) is in the unhooked configuration of the ski boot (S) the joint (12) assumes the second position (FC2); when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B) the abutting portion (18) of the blocking lever (17) abuts the joint (12) and blocks the joint (12) in the third position (FC3).

6. The toe-piece of a ski binding (1) of any one of the preceding claims, wherein: the first elastic means (16) are interposed between the joint (12) and the activating lever (10) so as to exert an elastic force having at least a component directed along the axis of the ski, when the base (2) is fixed to the ski;
and the first through-hole (11) is dimensioned so that the movement of the activating lever (10) and of the blocking lever (17) with respect to the first rotating pivot (9) is along a direction having at least a component that is parallel to the axis of the ski, when the base (2) is fixed to the ski.

7. The toe-piece of a ski binding (1) of any one of the preceding claims, wherein the first guide (4) and the second guide (6) extend to be convergent, so as: to block the joint (12) at the first position (FC1), when the toe-piece of the ski binding (1) assumes the hooked configuration of the ski boot (A); to block the joint (12) at the second position (FC2) when the toe-piece of the ski binding (1) assumes the unhooked configuration of the ski boot (S); blocking the joint (12) at the third position (FC3), when the toe-piece of the ski binding (1) is in the blocking configuration of the ski boot (B).

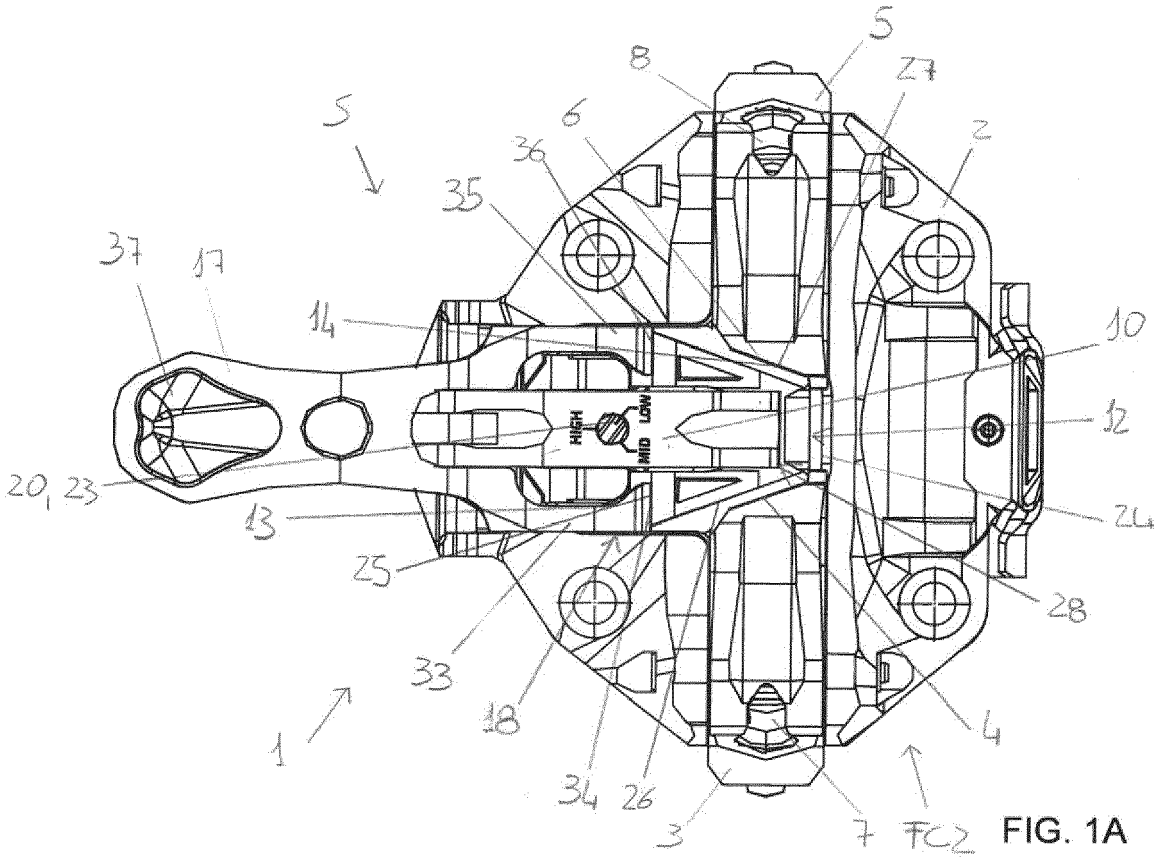

5
8
27
6
36
35
2
37
17
14
10
HIGH
LOW
MID
12
20, 23
24
13
25
28
33
18
4
1
34
26
3
7
FC2

FIG. 1A

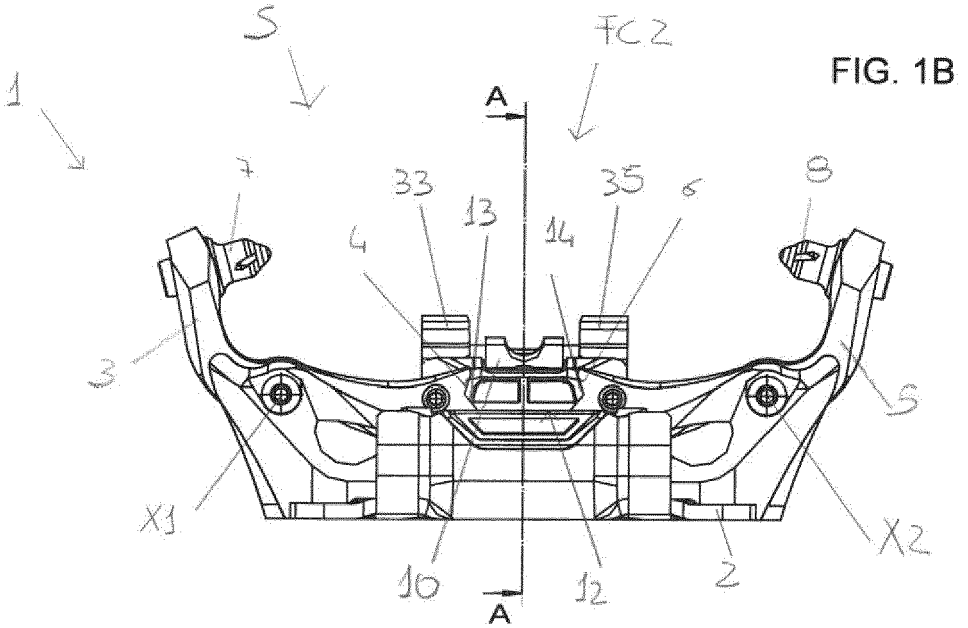

5
FC2
1
A
7
33
13
35
6
8
4
14
3
5
X1
X2
10
12
2
A

FIG. 1B

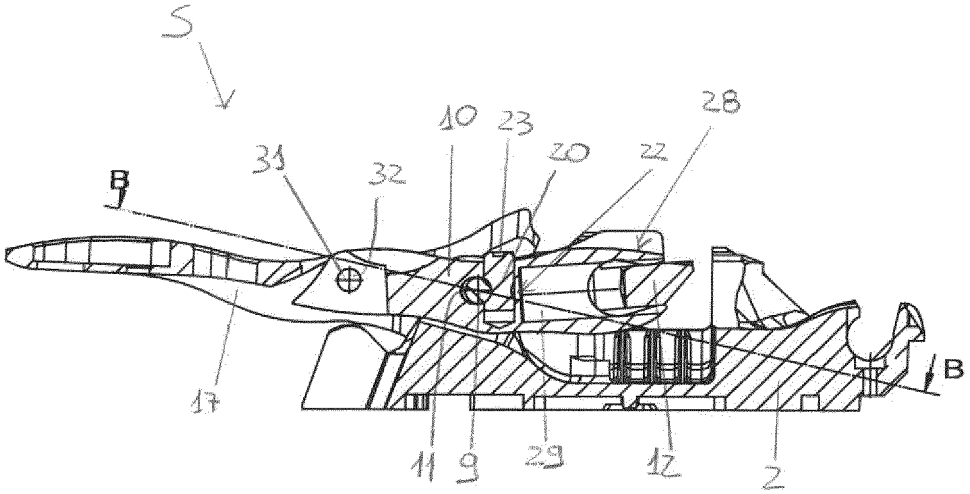

S
10
23
28
31
32
20
22
B
B
17
11
9
29
12
2

FIG. 1C

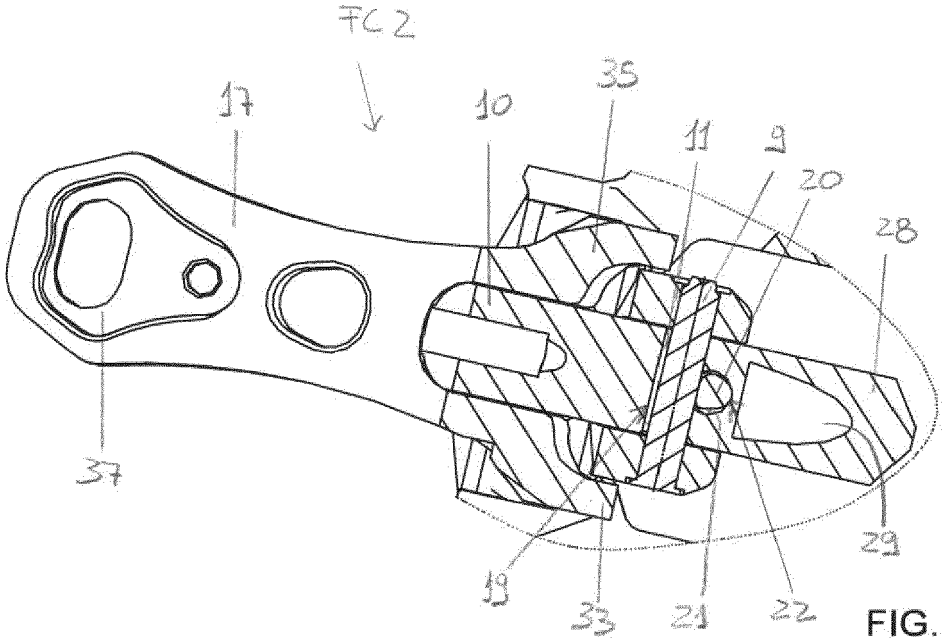

FC2
17
10
35
11
9
20
28
37
29
19
33
21
22

FIG. 1D

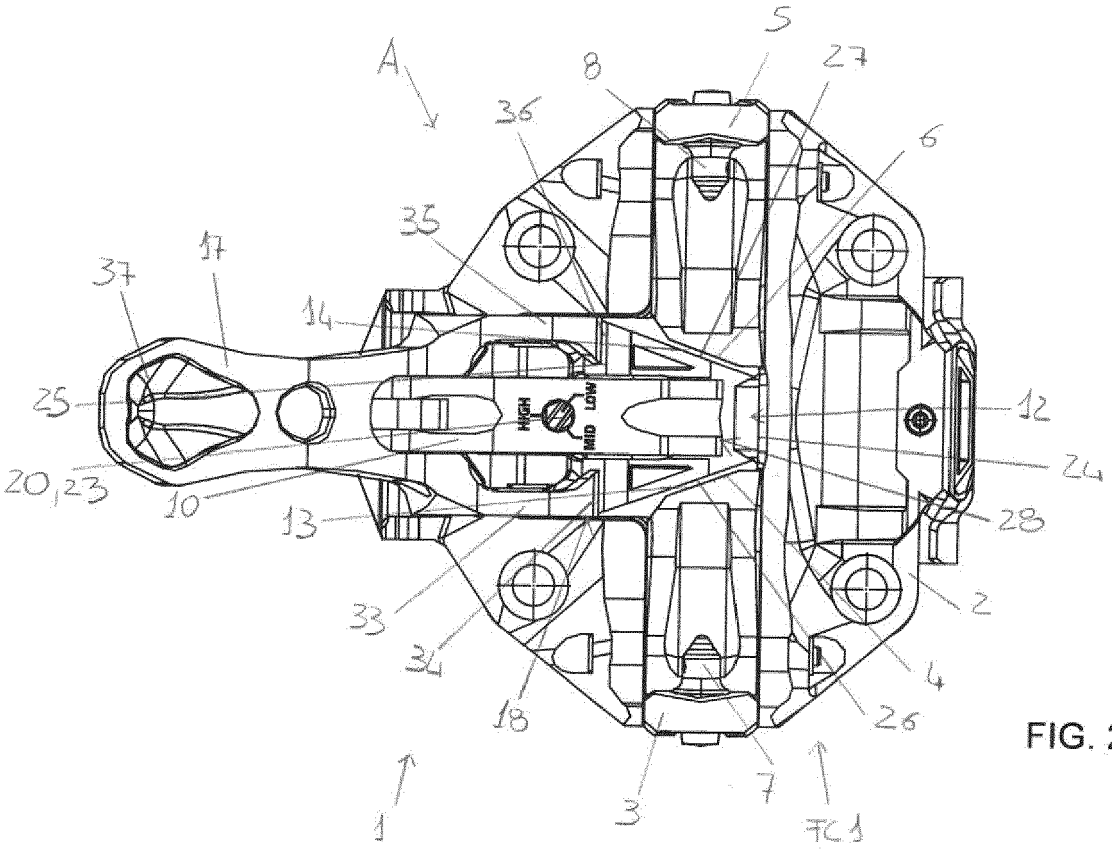

A
5
8
27
36
6
35
37
17
14
25
12
20,23
10
13
24
28
33
2
34
4
18
26
1
3
7
FC1
HIGH
MID
LOW

FIG. 2A

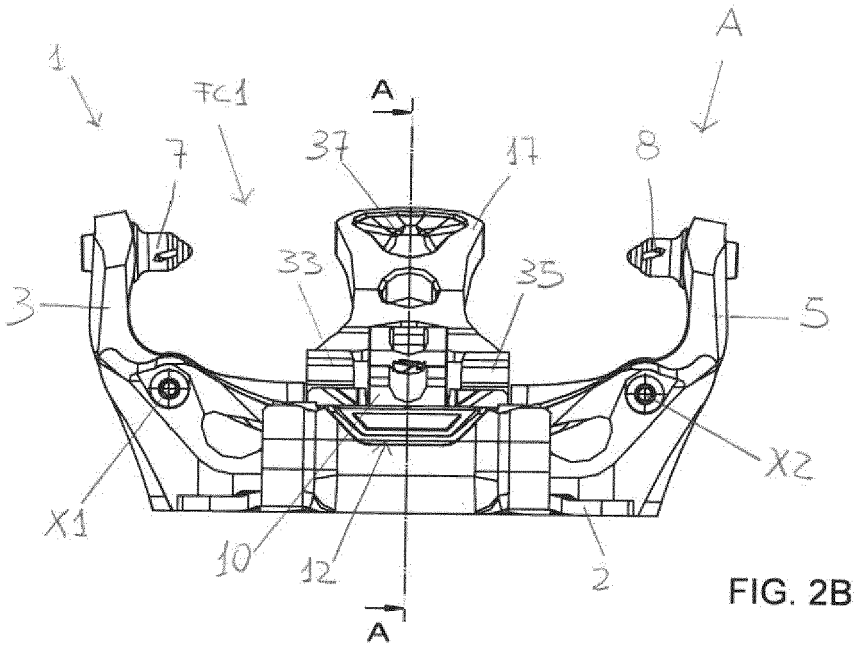

1
FC1
A
A
7
37
17
8
33
35
3
5
X1
X2
10
12
2

FIG. 2B

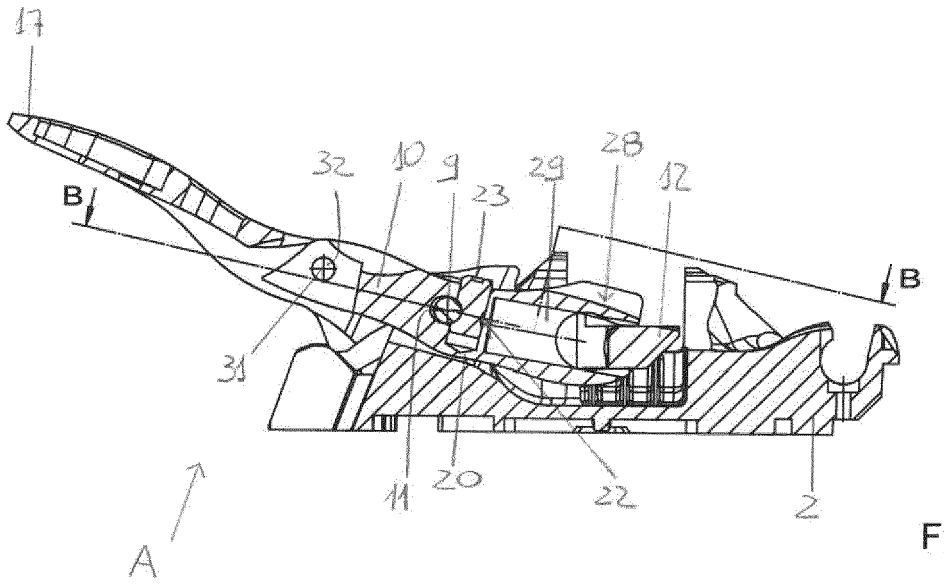


FIG. 2C

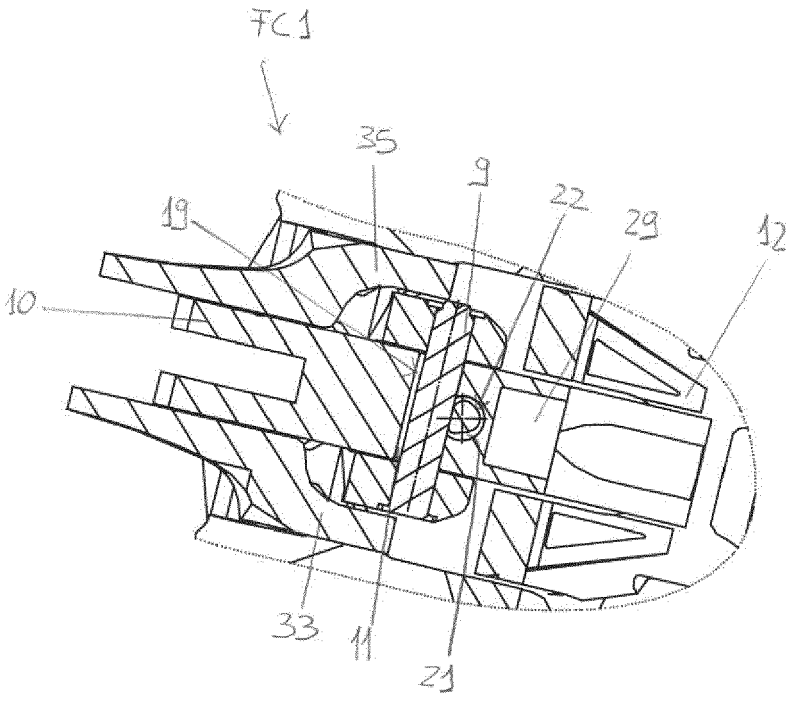


FIG. 2D

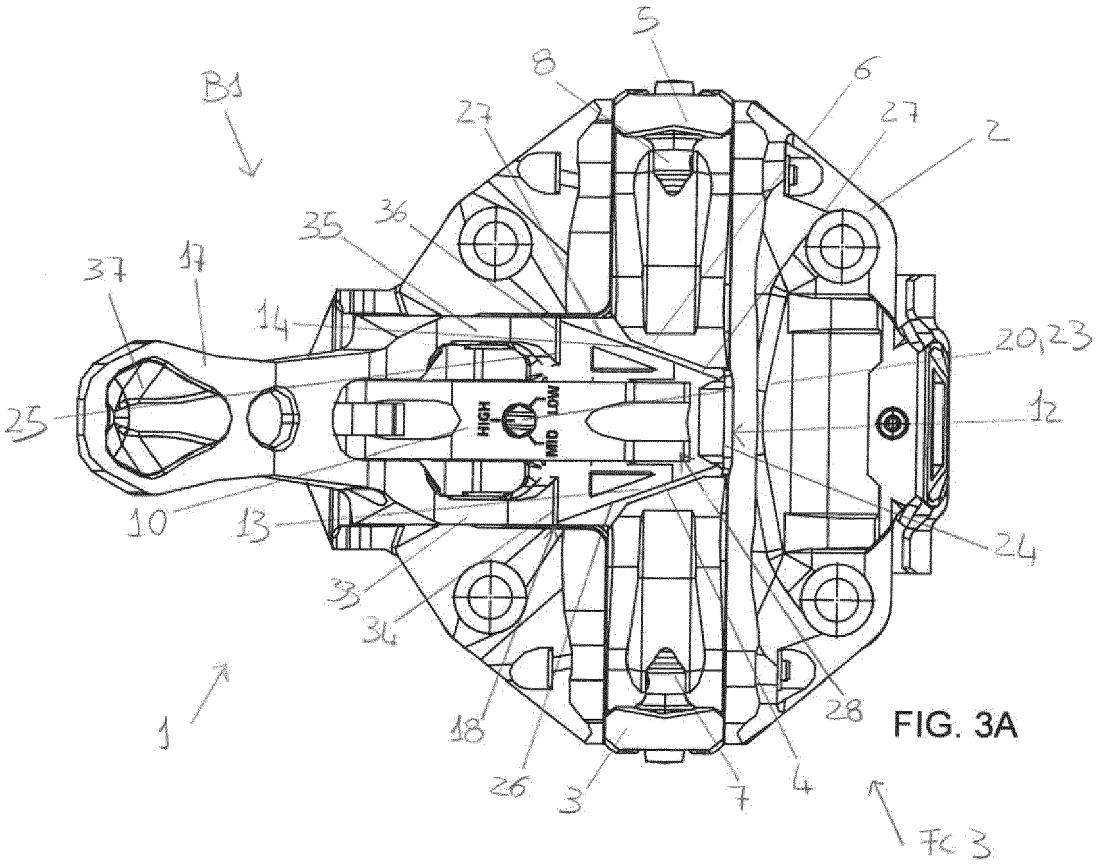

B1
5
8
6
27
27
2
35
36
37
17
14
20,23
25
HIGH
LOW
DIM
12
10
13
24
33
34
1
18
28
26
3
7
4
Fc3

FIG. 3A

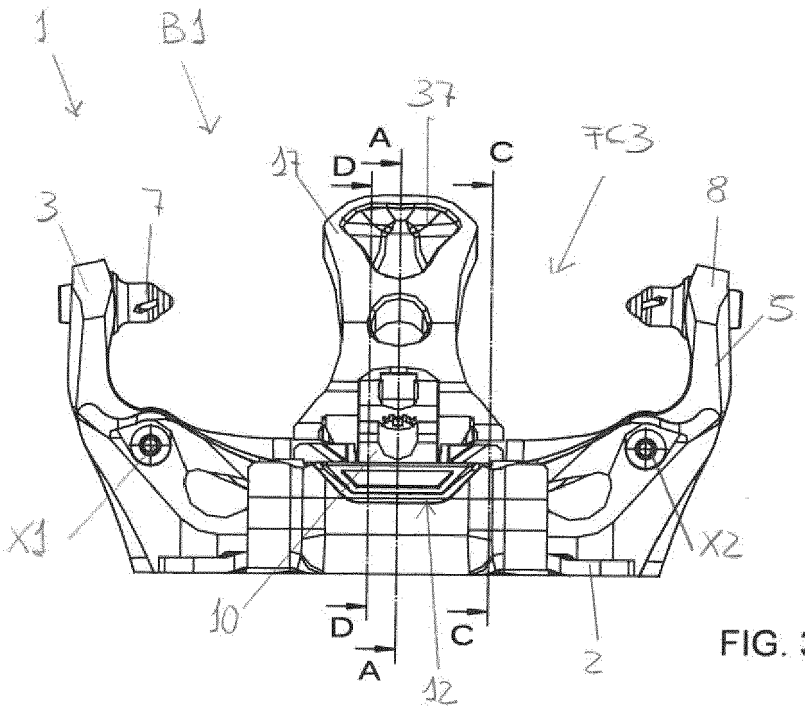

1
B1
37
A
17
D
C
Fc3
3
7
8
5
X1
X2
10
D
C
A
12
2

FIG. 3B

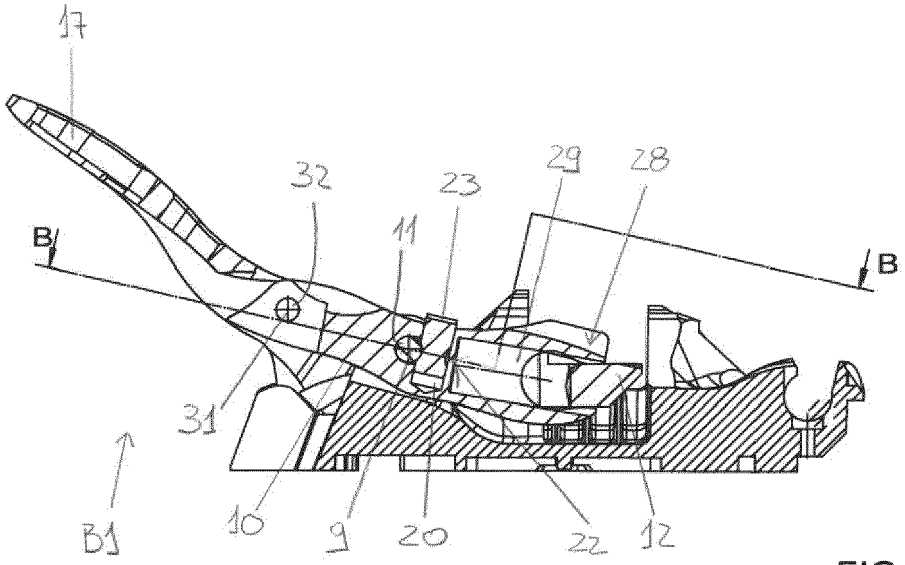

17
32
23
29
28
11
B
B
31
B1
10
9
20
22
12

FIG. 3C

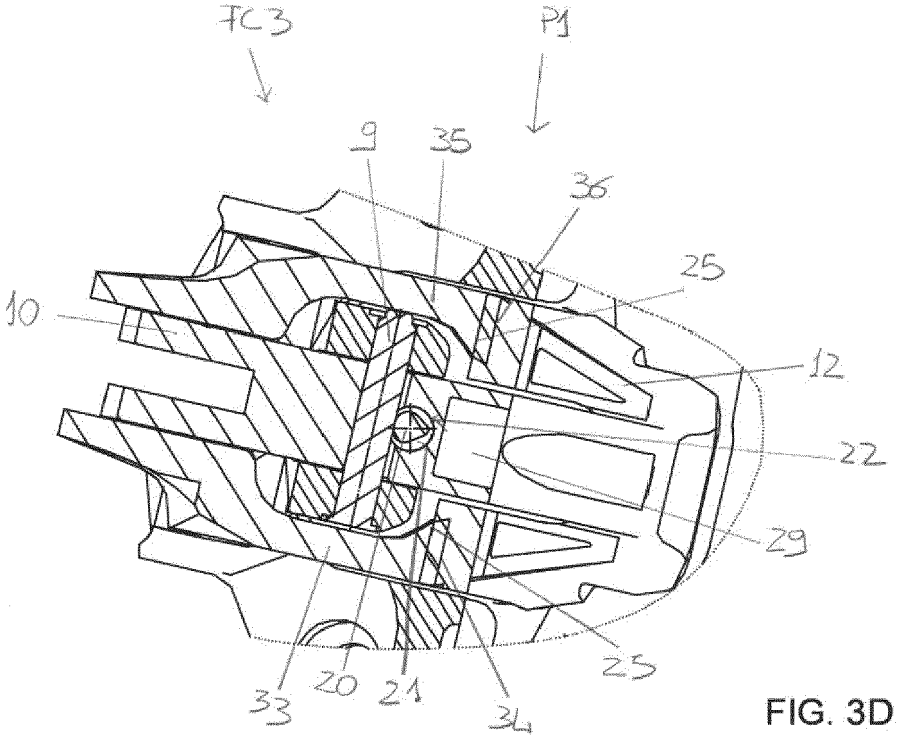

TC3
P1
9
35
36
25
10
12
22
29
25
33
20
21
34

FIG. 3D

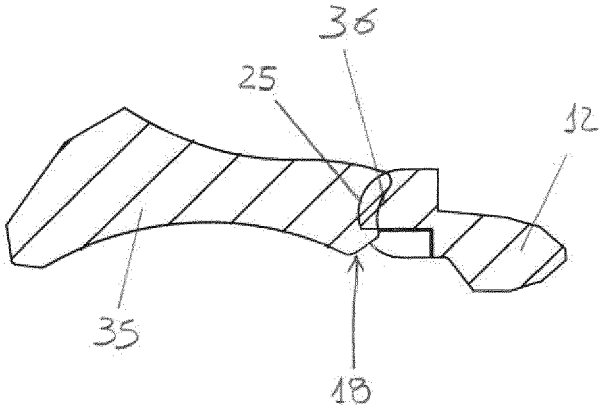


FIG. 3E

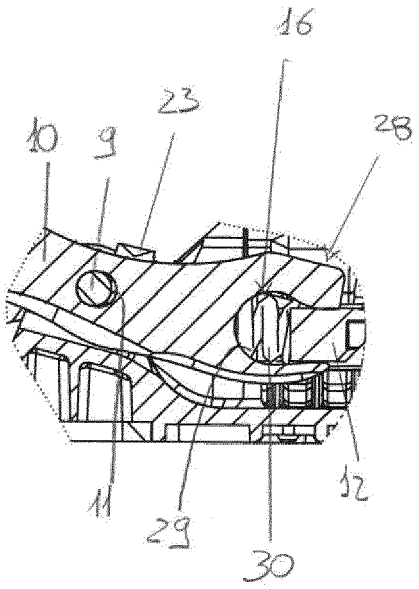


FIG. 3F

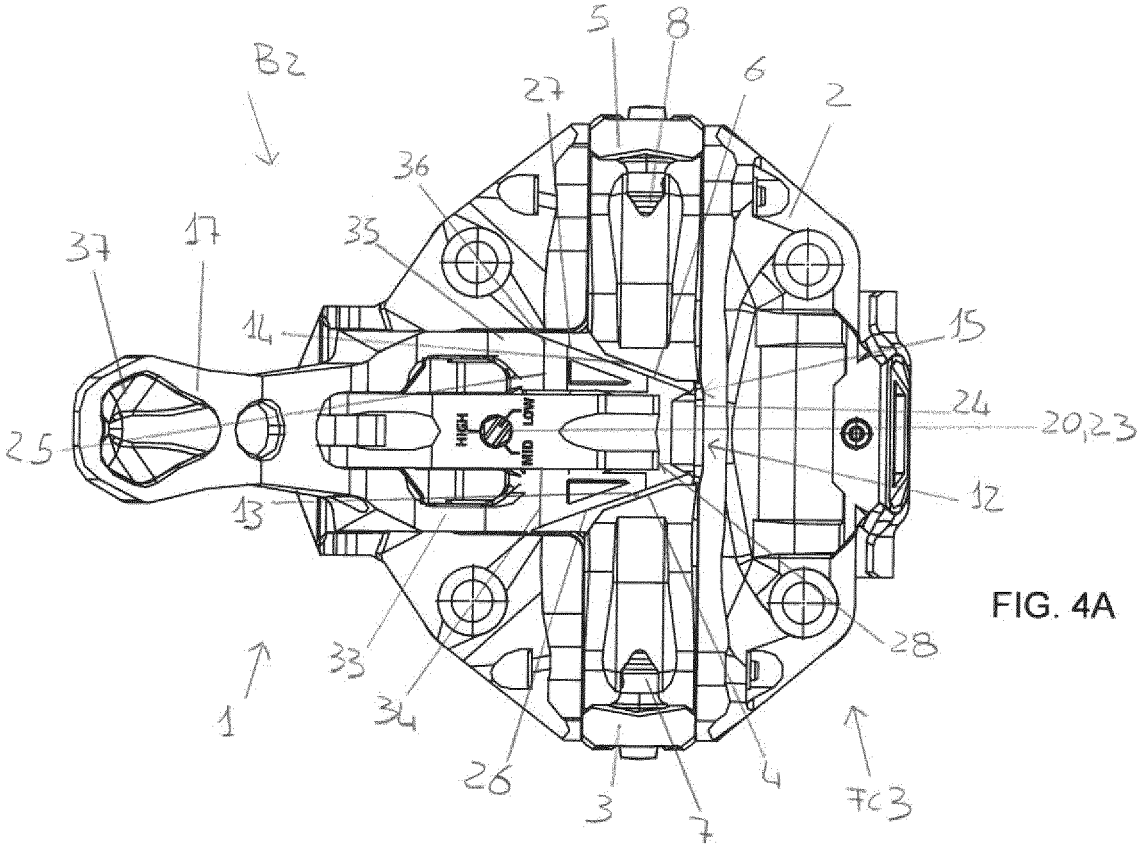

B2
5
8
6
2
27
36
35
37
17
14
15
24
20,23
25
HIGH
LOW
MID
13
12
28
33
34
1
26
3
7
4
FC3

FIG. 4A

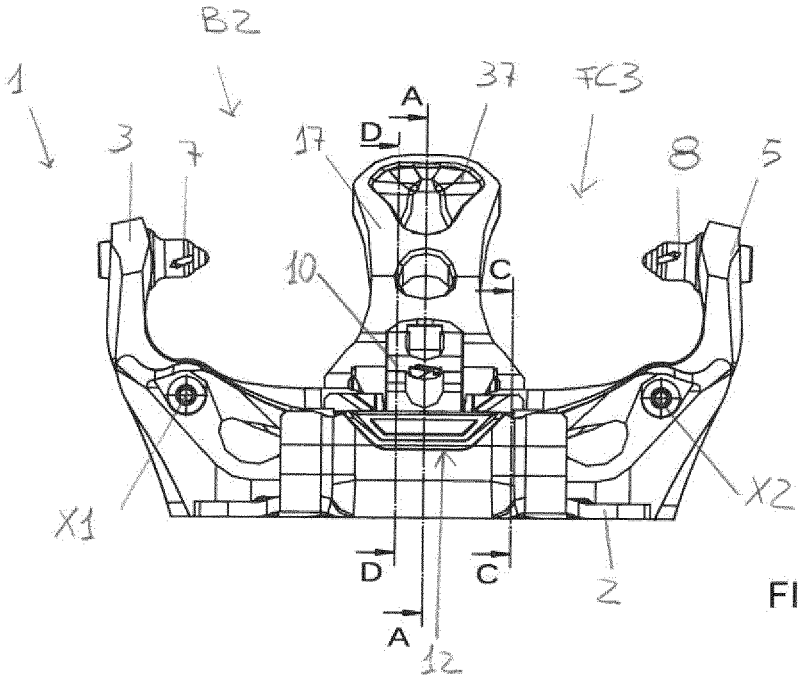

B2
1
3
7
A
D
17
37
FC3
8
5
10
C
X1
X2
D
C
2
A
12

FIG. 4B

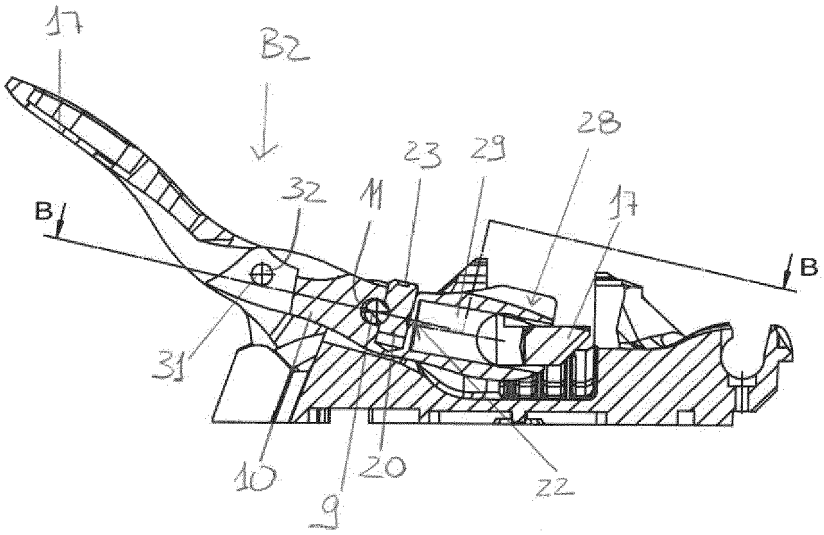

17
B2
28
23
29
32
11
17
B
B
31
10
20
9
22

FIG. 4C

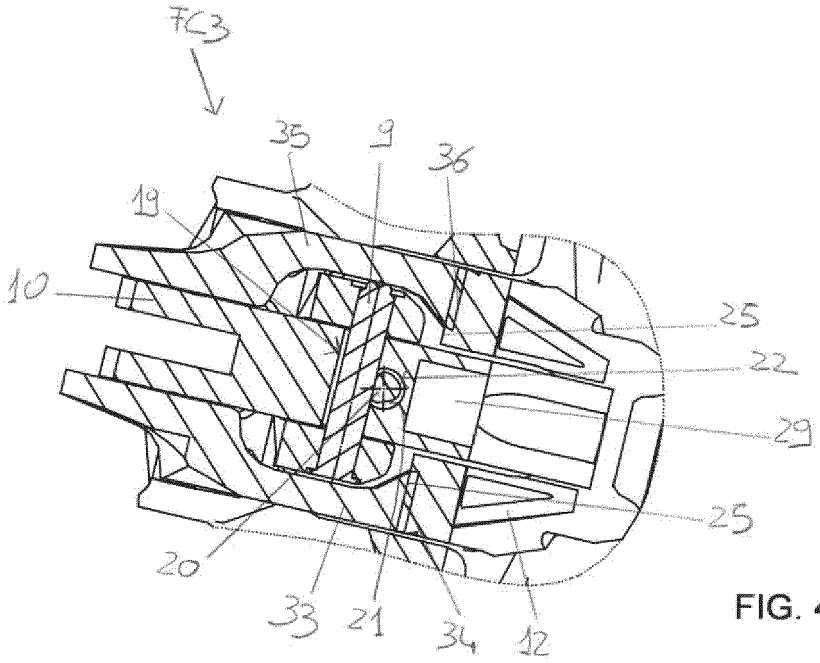

FC3
35
9
36
19
10
25
22
29
25
20
33
21
34
12

FIG. 4D

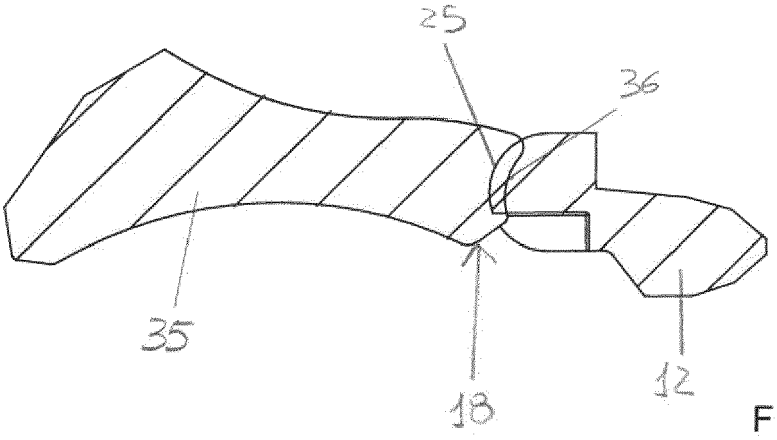


FIG. 4E

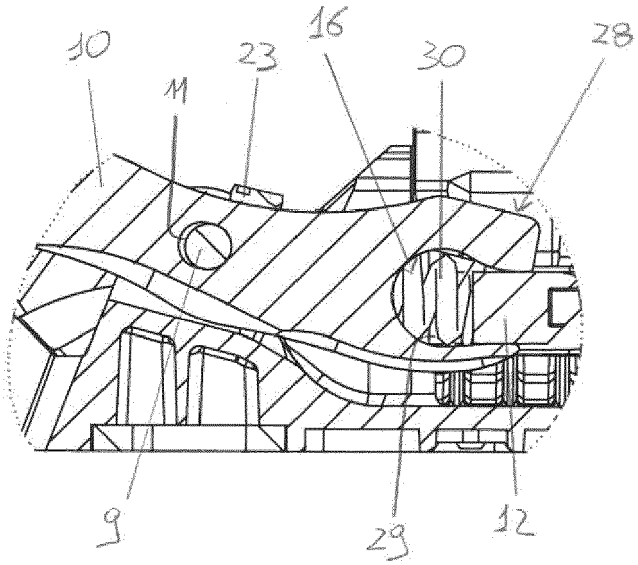
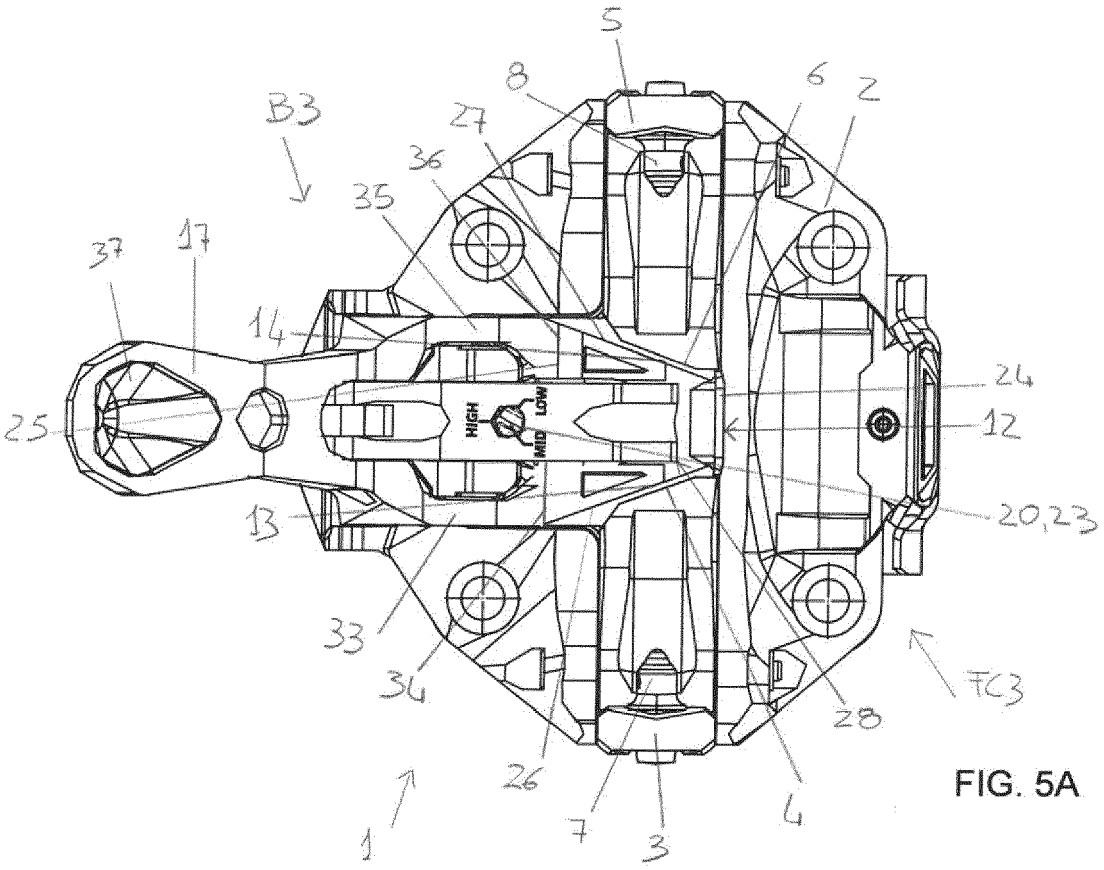


FIG. 4F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8
6
2
B3
27
36
35
37
17
14
24
25
HIGH
MID
LOW
12
13
20,23
33
36
FC3
28
26
7
3
4
1

FIG. 5A

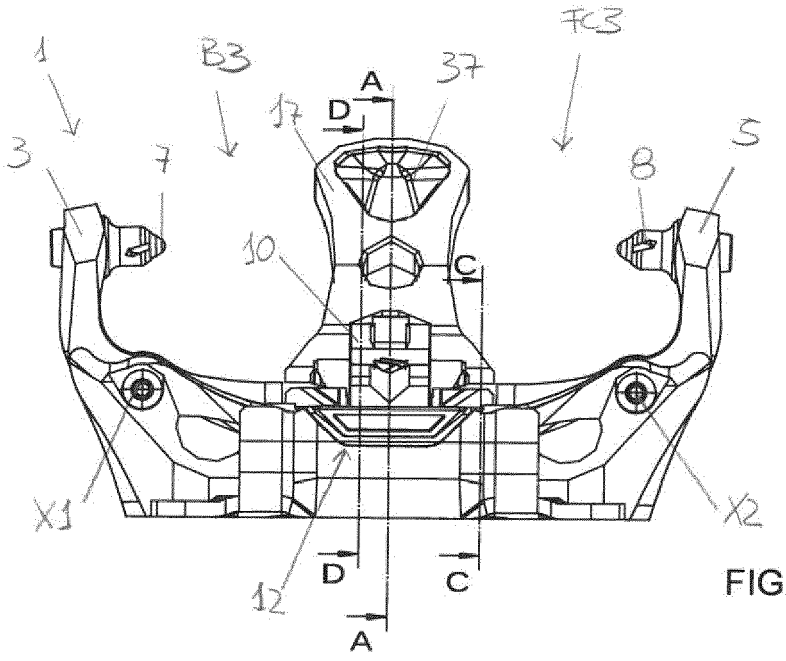

1
B3
FC3
A
37
17
D
3
7
8
5
10
C
X1
X2
12
D
C
A

FIG. 5B

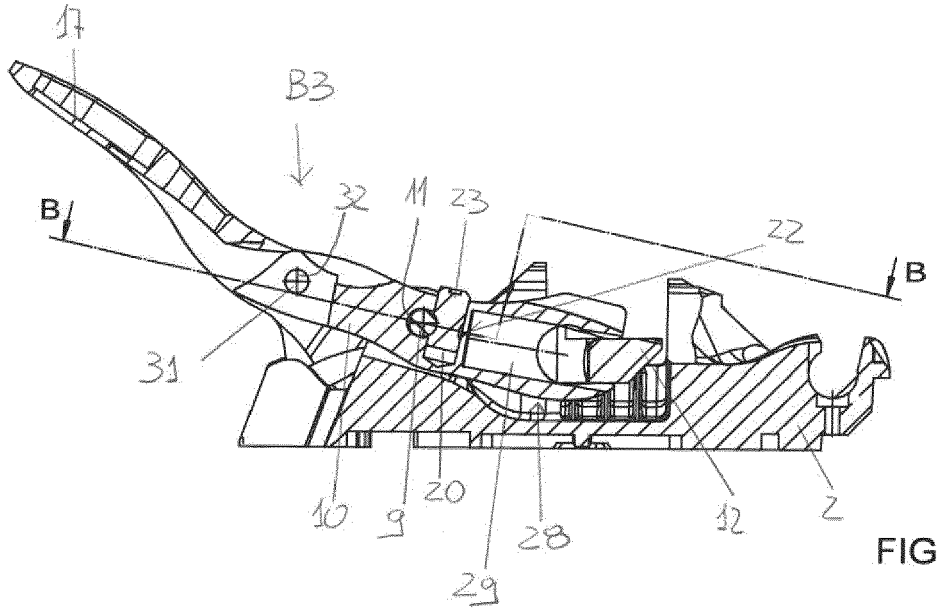

17
B3
B
32
11
23
22
B
31
10
9
20
28
29
12
2

FIG. 5C

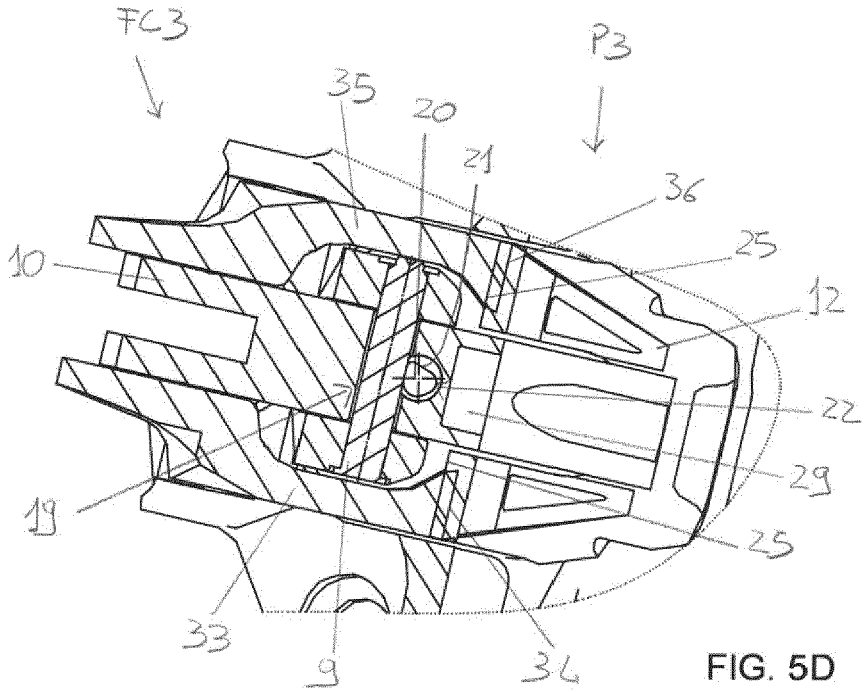

FC3
P3
35
20
21
36
25
10
12
22
29
19
25
33
9
34

FIG. 5D

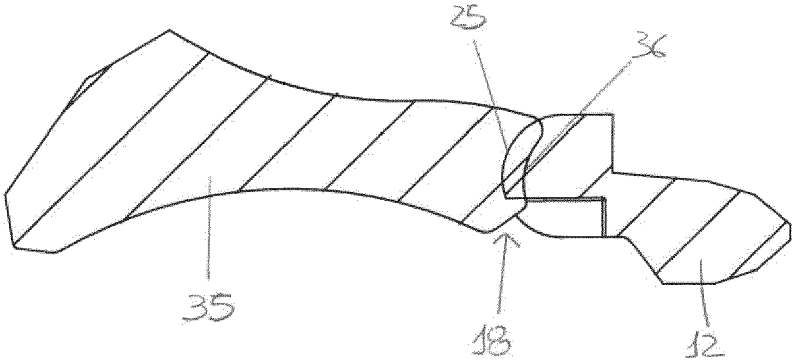


FIG. 5E

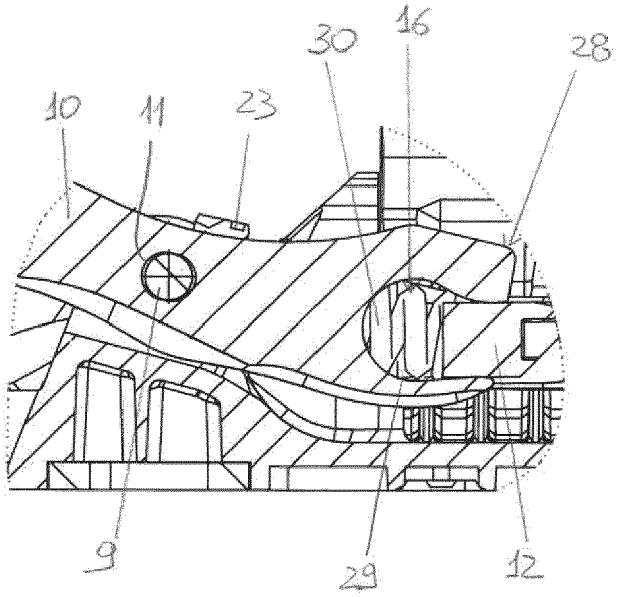


FIG. 5F

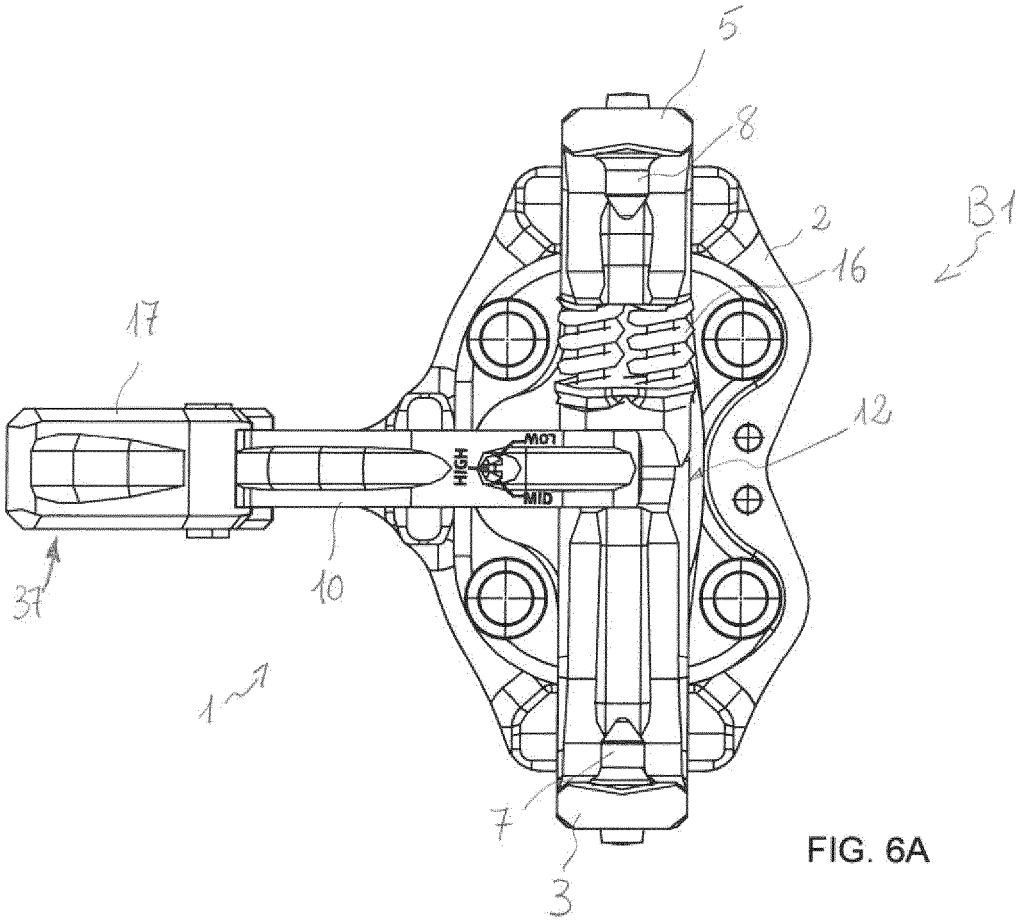


FIG. 6A

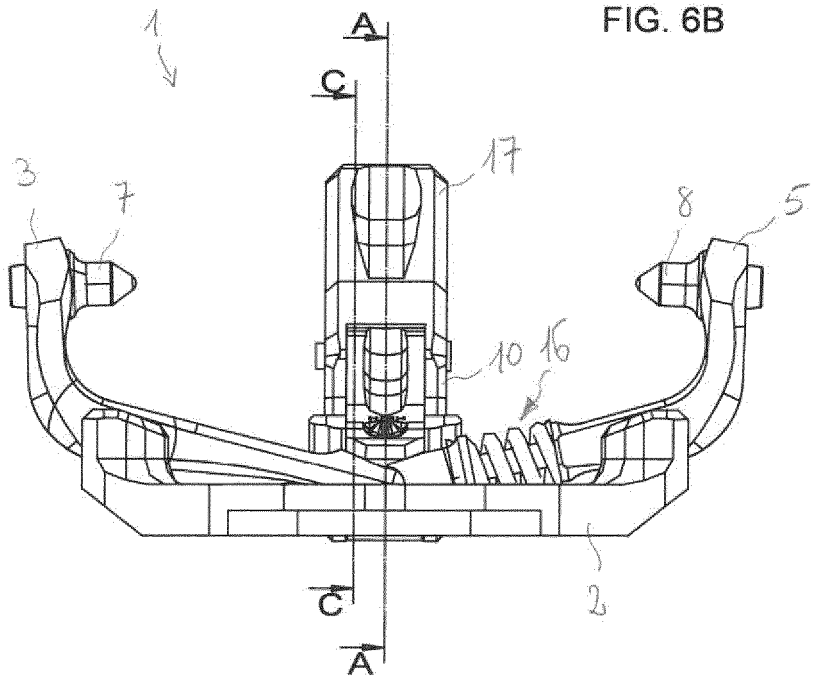


FIG. 6B

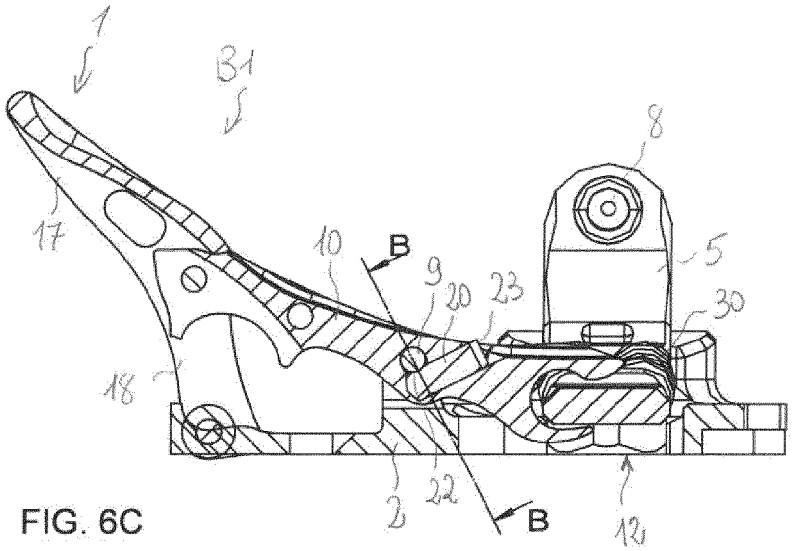


FIG. 6C

FIG. 6D

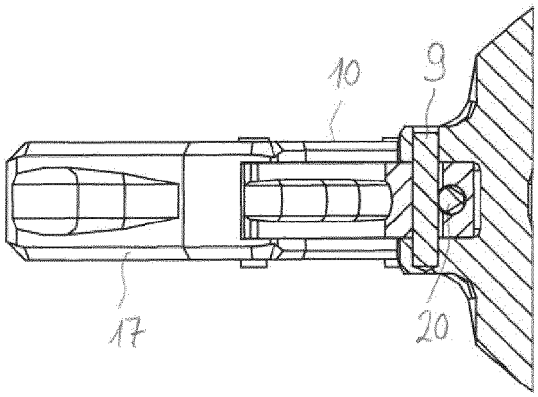
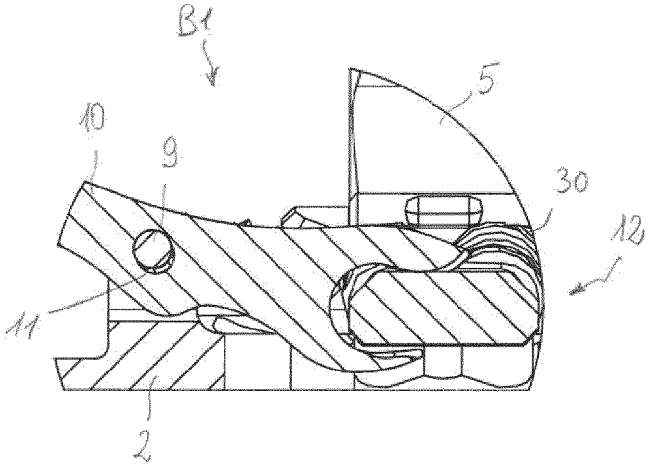


FIG. 6E



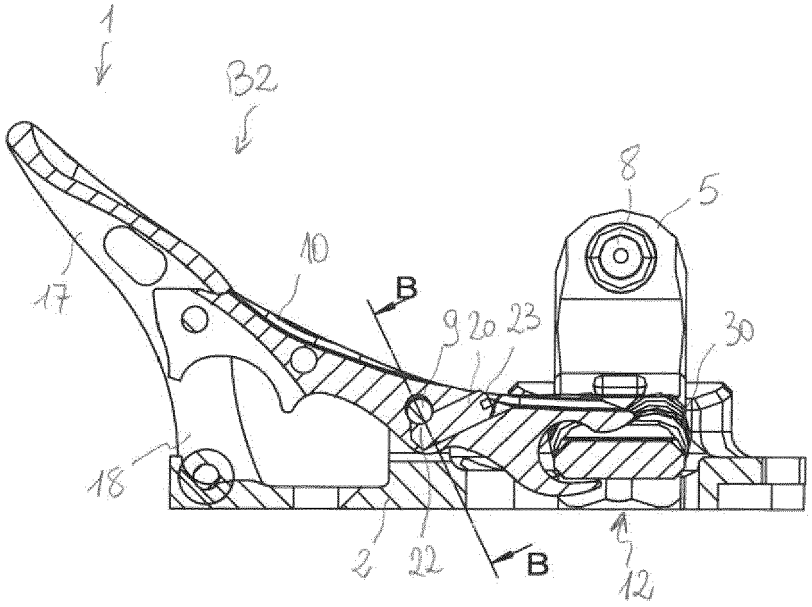
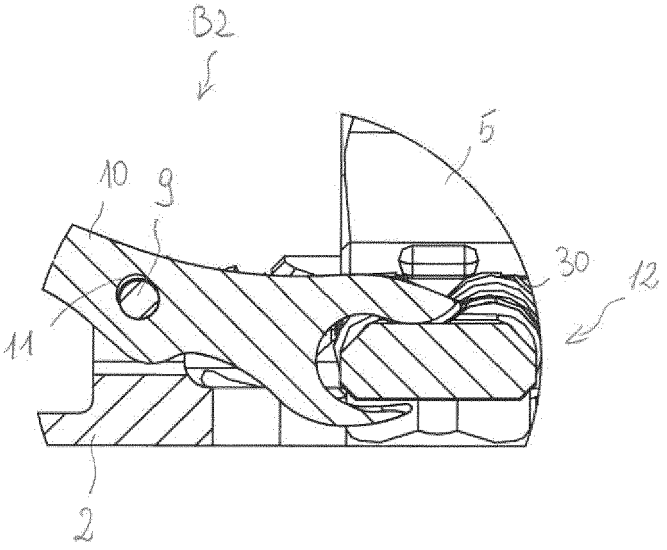


FIG. 7A

FIG. 7B



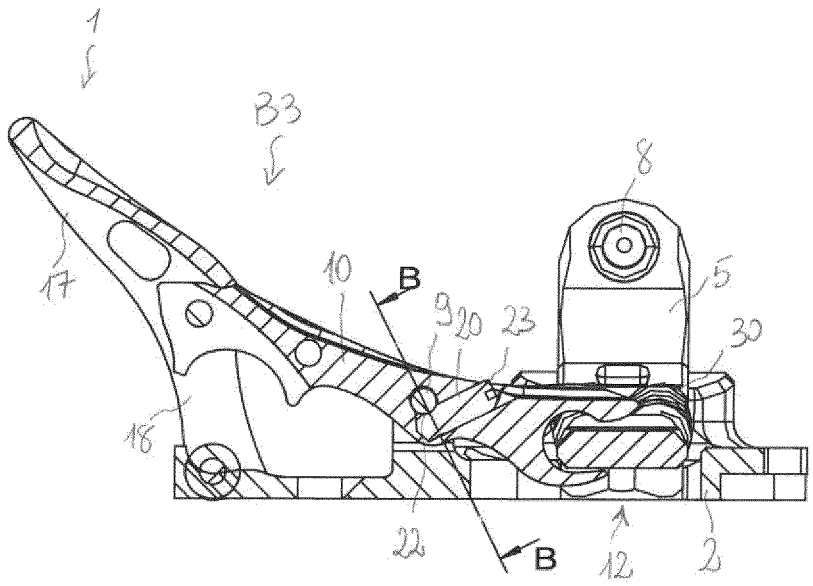
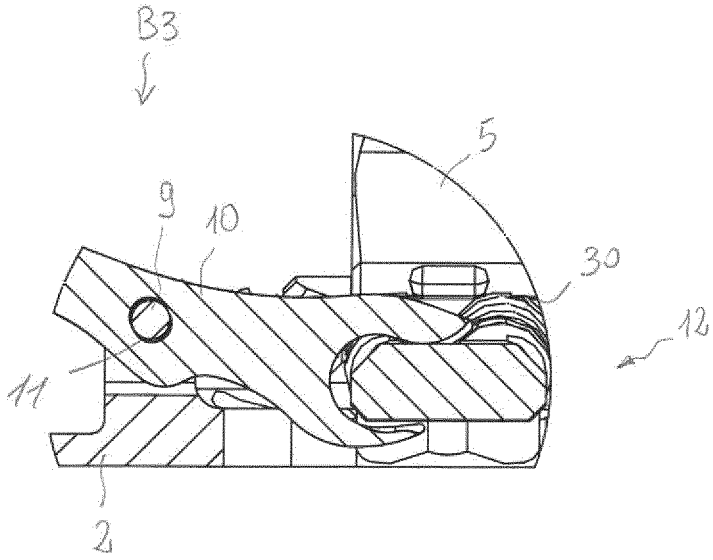


FIG. 8A

FIG. 8B



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EUROPEAN SEARCH REPORT

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	26 May 2020	Murer, Michael

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