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(54) **TOURING SKI BINDING**

(57) A toe-piece of a ski binding (1), comprising: a base (2) which is fixable to a ski; a first jaw (3); a second jaw (4); a first pin (5) which is borne by the first jaw (3) for inserting in a first lateral hole fashioned in a tip of a ski boot; a second pin (6) which is borne by the second jaw (4) for inserting in a second lateral hole opposite the first lateral hole fashioned in the tip of the ski boot; a first guide (7) which is borne by the base (2), which has a first portion (8) which extends away from the longitudinal axis of the ski, when the base (2) is fixed to the ski, and which has a second portion (9), following the first portion (8), which extends towards the front part of the ski, when the

base (2) is fixed to the ski; a second guide (10) which is borne by the base (2), which has a third portion (11) which extends away from the longitudinal axis of the ski, when the base (2) is fixed to the ski, and which has a fourth portion (12), following the third portion (11), which extends towards the front part of the ski, when the base (2) is fixed to the ski; a first couple of sliding elements (13) which are borne by the first jaw (3) and which engage slidably along the first guide (7); and a second couple of sliding elements (16) which are borne by the second jaw (4) and which engage slidably along the second guide (10).

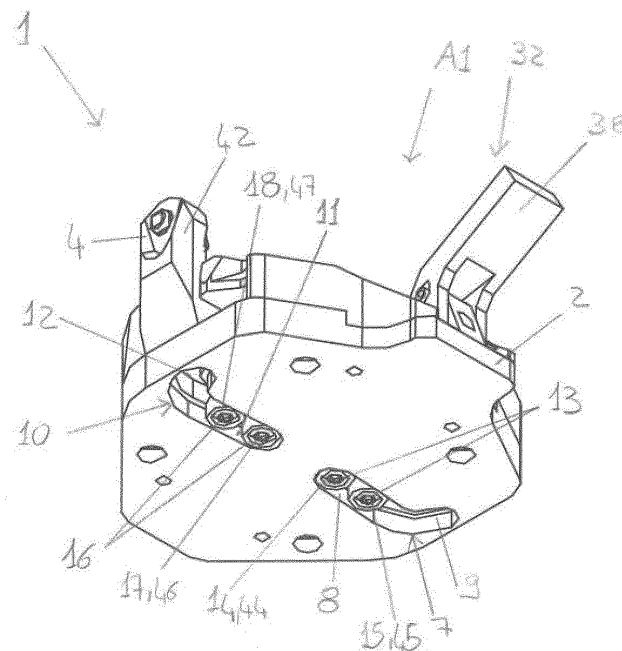


FIG. 1B

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Description

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

[0002] In ski mountaineering toe-pieces of ski bindings are used which enable unhooking the ski boot during descent where there is a fall, or a twist of a foot, or in any case each time the ski boot transmits to the toe-piece of the ski binding a transversal force directed towards the outside, greater than a threshold value.

[0003] An example of a toe-piece of the ski binding of this type is the one divulged in patent no. EP1907078 which comprises: a base which is fixable to a ski; a first jaw; a second jaw; a first pin for inserting in a first lateral hole fashioned in the tip of a ski boot, which first pin is borne by the first jaw; a second pin for inserting in a second lateral hole opposite the first lateral hole fashioned in the tip of the ski boot, which second pin is borne by the second jaw. The first jaw and the second jaw are rotoidally coupled to the base by means of respective pins that are perpendicular to the base, in order to enable the toe-piece of the ski binding to be hooked or unhooked from the ski boot.

[0004] The aim of the present invention consists in describing a toe-piece of a ski binding that offers an alternative to what is described in the foregoing.

[0005] The above is attained by a toe-piece of a ski binding according to claim 1.

[0006] Specific embodiments of the invention will be described in the following part of the present description, according to what is set down in the claims and with the aid of the accompanying tables of drawings, in which:

- figures 1A, 1B and 1C are respectively two perspective views and a lateral view of a toe-piece of a ski binding according to the invention, in a first hooked configuration of the ski boot
- figure 1D is a view alike to that of figure 1C where the base has been omitted in order better to view the remaining elements of the toe-piece of the ski binding;
- figures 1E, 1F and 1G are respectively a view of section A-A of figure 1C, a partial view of section E-E of figure 1C and a view of section B-B of figure 1D;
- figure 1H is a view of section F-F of figure 1G;
- figures 1I and 1L are respectively a view of section C-C of figure 1C and a view of section D-D of figure 1C;
- figures 2A, 2B and 2C are respectively two perspective views and a lateral view of a toe-piece of a ski binding according to the invention, in a first unhooked configuration of the ski boot;

- figure 2D is a view alike to that of figure 2C where the base has been omitted in order better to view the remaining elements of the toe-piece of the ski binding;
- figures 2E, 2F and 2G are respectively a view of section A-A of figure 2C, a partial view of section E-E of figure 2C and a view of section B-B of figure 2D;
- figure 2H is a view of section F-F of figure 2G;
- figures 2I and 2L are respectively a view of section C-C of figure 2C and a view of section D-D of figure 2C;
- figures 3A, 3B and 3C are respectively two perspective views and a lateral view of a toe-piece of a ski binding according to the invention, in a second unhooked configuration of the ski boot;
- figure 3D is a view alike to that of figure 3C where the base has been omitted in order better to view the remaining elements of the toe-piece of the ski binding;
- figures 3E, 3F and 3G are respectively a view of section A-A of figure 3C, a partial view of section E-E of figure 3C and a view of section B-B of figure 3D;
- figure 3H is a view of section F-F of figure 3G;
- figures 3I and 3L are respectively a view of section C-C of figure 3C and a view of section D-D of figure 3C;
- figures 4A, 4B and 4C are respectively two perspective views and a lateral view of a toe-piece of a ski binding according to the invention, in a second hooked configuration of the ski boot;
- figure 4D is a view alike to that of figure 4C where the base has been omitted in order better to view the remaining elements of the toe-piece of the ski binding;
- figures 4E, 4F and 4G are respectively a view of section A-A of figure 4C, a partial view of section E-E of figure 4C and a view of section B-B of figure 4D;
- figure 4H is a view of section F-F of figure 4G;
- figures 4I and 4L are respectively a view of section C-C of figure 4C and a view of section D-D of figure 4C.

[0007] With reference to the accompanying figures, reference numeral (1) denotes in its entirety a toe-piece of the ski binding according to the present invention, com-

prising: a base (2) which is fixable to a ski; a first jaw (3); a second jaw (4); a first pin (5) for inserting in a first lateral hole fashioned in the tip of a ski boot, which first pin (5) is borne by the first jaw (3); a second pin (6) for inserting in a second lateral hole opposite the first lateral hole fashioned in the tip of the ski boot, which second pin (6) is borne by the second jaw (4); a first guide (7) which is borne by the base (2), which has a first portion (8) which extends away from the longitudinal axis of the ski, when the base (2) is fixed to the ski, and which has a second portion (9), following the first portion (8), which extends towards the front part of the ski, when the base (2) is fixed to the ski; a second guide (10) which is borne by the base (2), which has a third portion (11) which extends away from the longitudinal axis of the ski, when the base (2) is fixed to the ski, and which has a fourth portion (12), following the third portion (11), which extends towards the front part of the ski, when the base (2) is fixed to the ski; a first couple of sliding elements (13) which is borne by the first jaw (3) and which is formed by a first sliding element (14) and a second sliding element (15), which first sliding element (14) and second sliding element (15) slidably engage, one following the other, along the first guide (7); a second couple of sliding elements (16) which is borne by the second jaw (4) and which is formed by a third sliding element (17) and a fourth sliding element (18), which third sliding element (17) and fourth sliding element (18) slidably engage, one following the other, along the second guide (10).

[0008] The toe-piece of the ski binding (1) is configured so as to assume a first hooked configuration of the ski boot (A1), (see figures 1A-1L), in order to hook the tip of a ski boot, wherein the first pin (5) and the second pin (6) are located away from one another by a first distance, wherein the first sliding element (14) and the second sliding element (15) are located in the first portion (8) of the first guide (7), and wherein the third sliding element (17) and the fourth sliding element (18) are located in the third portion (11) of the second guide (10); a first unhooked configuration of the ski boot (S1) (see figures 2A-2L), for unhooking the tip of a ski boot, which first unhooked configuration of the ski boot (S1) is obtained starting from the first hooked configuration of the ski boot (A1) after the first couple of sliding elements (13) has carried out a first run along the first guide (7) and the second couple of sliding elements (16) has carried out a second run along the second guide (10) (compare figures 1B and 2B and figures 1F and 2F), so that the first pin (5) and the second pin (6) reach a second distance that is greater than the first distance; and a second unhooked configuration of the ski boot (S2) (see figures 3A-3L), for unhooking the tip of a ski boot, which second unhooked configuration of the ski boot (S2) is obtained starting from the first hooked configuration of the ski boot (A1) after the at least one from between the first couple of sliding elements (13) and the second couple of sliding elements (16) has carried out a third run and/or a fourth run, longer than the first run and second run (compare figures 2B

and 3B, and 1B and 3B and figures 2F and 3F, and 1F and 3F), respectively along the first guide (7) and/or the second guide (10), along which third run at least one from between the first sliding element (14) and the second sliding element (15) of the first couple of sliding elements (13) is arranged in the second portion (9) of the first guide (7) and/or along which fourth run at least one from between the third sliding element (17) and the fourth sliding element (18) of the second couple of sliding elements (16) is arranged in the fourth portion (12) of the second guide (10), so that the first pin (5) and the second pin (6) reach a third distance and so that the first pin (5) and/or the second pin (6) is/are orientated obliquely with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, so that the tip of the ski boot can move away transversally with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski.

[0009] The expression "move away transversally with respect to the longitudinal axis of the ski" is taken to mean that the ski boot moves away with respect to the longitudinal axis of the ski carrying out a movement which has at least one perpendicular component with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski.

[0010] The expressions "at least one from among the first sliding element (14) and the second sliding element (15)" and "at least one from among the third sliding element (17) and the fourth sliding element (18)" should be understood as, respectively, at least the sliding member (14, 15 and 17, 18) of the first couple of sliding elements (13) and of the second couple of sliding elements (16) which is further away from the longitudinal axis of the ski, when the base (2) is fixed to the ski.

[0011] It is further specified that the second unhooked configuration of the ski boot (S2) is the automatic unhooked configuration of the ski boot during the descent, i.e. the configuration that the toe-piece of the ski binding (1) assumes in the case of impacts or urges on the toe-piece of the ski binding (1) or on the ski boot, which are translated into a first transversal force and directed towards the outside and/or into a second transversal force and directed towards the outside which acts on the first jaw (3) and/or on the second jaw (4) and which are/is of a higher intensity than a first threshold value and/or a second threshold value.

[0012] Generally only one from between the first jaw (3) and the second jaw (4) is affected, respectively, by a first transversal force and directed outwards that is of a higher intensity than a first threshold value and/or a second transversal force directed outwards that is greater than the second threshold value. In detail, in figures 3A-3L, only the first jaw (3) is affected by the first transversal force and directed towards the outside, so only the first couple of sliding elements (13) performs a third run, drawing with it the respective jaw (3), while the other is practically stopped in the position assumed at the first hooked configuration of the ski boot (A1).

[0013] However, in a case in which, on the toe-piece

of the ski binding (1), or on the ski boot, there act, at the same time, or at a brief time lapse from one another, a first transversal force directed outwardly and a second transversal force directed outwardly, opposite the first transversal force, which affect, respectively, the first jaw (3) and the second jaw (4), then the first couple of sliding elements (13) and the second couple of sliding elements (16) can respectively perform, one independently of the other, a third run and a fourth run, drawing the first jaw (3) and the second jaw (4), up to reaching the position they assume at the second unhooked configuration (S2) of the ski boot.

[0014] The first jaw (3) is preferably C-shaped and comprises a first part (40) to which the first pin (5) is constrained and a second part (41) to which the first couple of sliding elements (13) is constrained (see figures 1A, 1C, 1D, 1H, 2A, 2C, 2D, 2H, 3A, 3C, 3H, 3D, 4A, 4C, 4D, and 4H).

[0015] The first pin (5) is preferably fixed to the first part (40).

[0016] The first jaw (3) is preferably constrained to the base (2) so that only the sliding of the first couple of sliding elements (13) is enabled along the first guide (7) (see figures 1A, 1C, 1D, 1H, 2A, 2C, 2D, 2H, 3A, 3C, 3H, 3D, 4A, 4C, 4D, and 4H).

[0017] The first couple of sliding elements (13) preferably rolls along the first guide (7), to limit friction forces.

[0018] Alternatively, the first couple of sliding elements (13) might slide along the first guide (7).

[0019] Likewise, the second jaw (4) is preferably C-shaped and comprises a third part (42) to which the second pin (6) is constrained and a fourth part (43) to which the second couple of sliding elements (16) is constrained (see figures 1A, 1C, 1D, 1H, 2A, 2C, 2D, 2H, 3A, 3C, 3H, 3D, 4A, 4C, 4D, and 4H).

[0020] The second pin (6) is preferably fixed to the third part (42).

[0021] The second jaw (4) is preferably constrained to the base (2) so that only the sliding of the second couple of sliding elements (16) is enabled along the second guide (10) (see figures 1A, 1C, 1D, 1H, 2A, 2C, 2D, 2H, 3A, 3C, 3H, 3D, 4A, 4C, 4D, and 4H).

[0022] The second couple of sliding elements (16) preferably rolls along the second guide (10), to limit friction forces.

[0023] Alternatively, the second couple of sliding elements (16) might slide along the second guide (10).

[0024] With particular reference to figures 1B, 1F, 2B, 2F, 3B, 3F, 4B, and 4F, the first guide (7) and the second guide (10) are preferably fashioned in the base (2). In detail, the first guide (7) and the second guide (10) are each defined by a relative cut made in the base (2) and profiled so as to receive and guide, one following another, respectively, the first sliding element (14) and the second sliding element (15) and the third sliding element (17) and the fourth sliding element (18).

[0025] Alternatively, in an embodiment that is not illustrated of the toe-piece of the ski binding (1), the first guide

(7) and the second guide (10) can be borne by the base (2), for example can be guide rails or rails of various types, fixed to the base (2) to receive and guide, one following another, respectively, the first sliding element (14) and the second sliding element (15) and the third sliding element (17) and the fourth sliding element (18).

[0026] The first jaw (3) is preferably coupled to the base (2) by means of the coupling between the first couple of sliding elements (13) and the first guide (7) so that the first jaw (3) can move parallel to the base (2).

[0027] Likewise, the second jaw (4) is preferably coupled to the base (2) by means of the coupling between the second couple of sliding elements (16) and the second guide (10) so that the second jaw (4) can move parallel to the base (2).

[0028] The first guide (7) can preferably be a curved guide, so as to make the movement of the first couple of sliding elements (13) along the first guide (7) more fluid (see for example figures 1B, 1F, 2B, 2F, 3B, 3F, 4B, 4F).

[0029] Likewise, the second guide (10) can preferably be a curved guide, so as to make the movement of the second couple of sliding elements (16) along the second guide (10) more fluid (see for example figures 1B, 1F, 2B, 2F, 3B, 3F, 4B, 4F).

[0030] In particular with reference to the preferred embodiment illustrated in the figures (see for example figures 1B, 1F, 2B, 2F, 3B, 3F, 4B, 4F), the first guide (7) and the second guide (10) preferably have an L-shape with a bevelled corner. The L-shape is orientated in such a way that the first branch of the L-shape, which corresponds, respectively, to the first portion (8) and the third portion (11), extends in a substantially perpendicular way to the longitudinal axis of the ski, when the base (2) is fixed to the ski, and the second branch of the L-shape, which corresponds, respectively, to the second portion (9) and the fourth portion (12), extends, starting from the first branch, obliquely with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, and is connected to the first branch by means of a connecting branch.

[0031] Alternatively, in an embodiment that is not illustrated, the first guide (7) can extend along a broken line, in other words the first guide (7) can comprise at least a first fitting, interposed between the first portion (8) and the second portion (9) to connect them, or it can also include a first series of fittings interposed between the first portion (8) and the second portion (9) to connect them.

[0032] Likewise, the second guide (10) can extend along a broken line, in other words the second guide (10) can comprise at least a second fitting, interposed between the third portion (11) and the fourth portion (12) to connect them, or it can also include a second series of fittings interposed between the third portion (11) and the fourth portion (12) to connect them.

[0033] The first portion (8) preferably extends in an arc of circumference having the relative centre at the region of space in which the heel of the ski boot rests on the

heel-piece when the base (2) is fixed to the ski, to facilitate the unhooking of the ski boot starting from the first hooked configuration of the ski boot (A1). Likewise, the third portion (11) preferably extends in an arc of circumference having the relative centre at the region of space in which the heel of the ski boot rests on the heel-piece when the base (2) is fixed to the ski, to facilitate the unhooking of the ski boot starting from the first hooked configuration of the ski boot (A1). In particular with reference to the preferred embodiment illustrated in the figures (see for example figures 1B, 1F, 2B, 2F, 3B, 3F, 4B, and 4F) the first portion (8) and the third portion (11) extend as two relative arcs of circumference having a radius that is substantially identical to the distance between the toe-piece of the ski binding (1) and the heel-piece for binding to the ski, when the base (2) is fixed to the ski.

[0034] The arc of circumference conformation of the first portion (8) and the third portion (11) is advantageously such that, during the passage from the first hooked configuration of the ski boot (A1) to the second unhooked configuration of the ski boot (S2), the urges to which the ski boot will be subjected, and therefore the skier's foot, while the first couple of sliding elements (13) and/or the second couple of sliding elements (16) travel along the first portion (8) and/or the third portion (11) are reduced with respect to those which the ski boot will be subjected when travelling along a straight portion.

[0035] Alternatively, according to an embodiment, not illustrated, the first portion (8) and the third portion (11) might be two straight segments.

[0036] The first sliding element (14) preferably comprises a first rotatable roller (44). The first rotatable roller (44) is preferably rotatable with respect to an axis that is substantially perpendicular to the base (2).

[0037] The first sliding element (14) preferably also comprises a first support (63) which is fixed to the first jaw (3) and which rotatably supports the first rotatable roller (44).

[0038] The second sliding element (15) also preferably comprises a second rotatable roller (45) which is rotatable with respect to an axis that is substantially perpendicular to the base (2).

[0039] The second sliding element (15) preferably also comprises a second support (64) which is fixed to the first jaw (3) and which rotatably supports the second rotatable roller (45) (see for example figures 1H, 2H, 3H and 4H).

[0040] The first rotatable roller (44) and the second rotatable roller (45) can advantageously roll along the first guide (7), reducing the friction forces, in passing from one configuration to another among those which the toe-piece of the ski binding (1) can assume.

[0041] Likewise, the third sliding element (17) preferably comprises a third rotatable roller (46). The third rotatable roller (46) is preferably rotatable with respect to an axis that is substantially perpendicular to the base (2).

[0042] The third sliding element (17) preferably also comprises a third support (65) which is fixed to the second

jaw (4) and which rotatably supports the third rotatable roller (46).

[0043] Further, the fourth sliding element (18) also preferably comprises a fourth rotatable roller (47) which is rotatable with respect to an axis that is substantially perpendicular to the base (2). Further, the fourth sliding element (18) preferably also comprises a fourth support (66) which is fixed to the second jaw (4) and which rotatably supports the fourth rotatable roller (47) (see for example figures 1H, 2H, 3H and 4H).

[0044] The third rotatable roller (46) and the fourth rotatable roller (47) can advantageously roll along the second guide (10), reducing the friction forces, in passing from one configuration to another among those which the toe-piece of the ski binding (1) can assume.

[0045] The toe-piece of a ski binding (1) preferably comprises stabilising means (19) which are configured so as to maintain the toe-piece of the ski binding (1) in the first hooked configuration of the ski boot (A1) when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1). Further, the toe-piece of the ski binding (1) is preferably configured in such a way that starting from the first hooked configuration of the ski boot (A1), when a first transversal force directed outwardly, which exceeds a first threshold value, acts on the first jaw (3) then the first couple of sliding elements (13) performs the third run along the first guide (7) and at least one from between the first sliding element (14) and the second sliding element (15) of the first couple of sliding elements (13) is arranged in the second portion (9) of the first guide (7), so that the toe-piece of the ski binding (1) reaches the second unhooked configuration of the ski boot (S2). Further, the toe-piece of the ski binding (1) is configured in such a way that starting from the first hooked configuration of the ski boot (A1), when a second transversal force directed outwardly, which exceeds a second threshold value, acts on the second jaw (4), then the second couple of sliding elements (16) carries out the fourth run along the second guide (10) and at least one from between the third sliding element (17) and the fourth sliding element (18) of the second couple of sliding elements (16) is arranged in the fourth portion (12) of the second guide (10), so that the toe-piece of the ski binding (1) reaches the second unhooked configuration of the ski boot (S2).

[0046] The stabilising means (19) are preferably designed so as to press against the first jaw (3) and against the second jaw (4) at least when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1), so that the first jaw (3) assumes a first stable balanced position (E1) along the first guide (7) or tends to reach the first stable balanced position (E1) after the first transversal force and directed outwardly, smaller than the first threshold value, has urged the first jaw (3), and so that the second jaw (4) assumes a second stable balanced position (E2) along the second guide (10) or tends to reach the second stable balanced position (E2) after the second transversal force and directed outward-

ly, smaller than the second threshold value, has urged the second jaw (4) (see figure 1E).

[0047] The stabilising means (19) advantageously make it such that the first jaw (3) and the second jaw (4) can move respectively from the first stable balanced position (E1) and from the second stable balanced position (E2) only if subjected to an outside force, in particular to an external force that has at least one transversal component and directed outwards, so as to exceed a first threshold value and/or a second threshold value. Therefore, by appropriately choosing the threshold value using an adequate design of the stabilising means, the skier can be saved from injury by guaranteeing the unhooking of the toe-piece of the ski binding (1) from the ski boot when the transversal force (i.e. it is greater than the first threshold value or the second threshold value) and, at the same time, by preventing involuntary unhooking due to outside forces lower than the threshold value, in these cases returning the first jaw (3) and the second jaw (4), respectively, towards the first stable balanced position (E1) and the second stable balanced position (E2).

[0048] The first threshold value and the second threshold value are preferably identical to one another.

[0049] With particular reference to figures 1A-1L and 3A-3L, the stabilising means (19) can press against the first jaw (3) and against the second jaw (4) also in the first hooked configuration (A1) and in the second unhooked configuration of the ski boot (S2).

[0050] The toe-piece of a ski binding (1) preferably further comprises a first abutting element (20) which is borne by the first jaw (3) and a second abutting element (21) which is borne by the second jaw (4). Further, the stabilising means (19) preferably comprise a pusher member (22) so as to press against the first jaw (3) and against the second jaw (4), which pusher member (22) acts along the longitudinal axis of the ski, when the base (2) is fixed to the ski, and comprises a first seating (23) conformed to receive the first abutting element (20) at least when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1), so that the first jaw (3) can assume the first stable balanced position (E1), and a second seating (24) having a shape conformed such as to receive the second abutting element (21) at least when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1), so that the second jaw (4) can assume the second stable balanced position (E2) (see figure 1E).

[0051] With a single pusher member (22) it will be advantageously possible to act at the same time, and with a stabilising action of the same intensity, on the first jaw (3), by means of the first abutting element (20), and on the second jaw (4), by means of the second abutting element (21), thus guaranteeing that there is symmetry with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, among the forces acting on the first jaw (3) and on the second jaw (4).

[0052] Alternatively, according to an embodiment, not illustrated, the stabilising means (19) might comprise a

first stabilising element, for example a first pusher member, or a first spring, or a first cam, arranged and designed to act on the first jaw (3), at least when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1), and a second stabilising element, for example a second pusher, or a second spring, or a second cam, arranged and designed to act on the second jaw (4), at least when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1).

[0053] The pusher member (22) preferably pushes towards the rear part of the ski, when the base (2) is fixed to the ski.

[0054] The first abutting element (20) can preferably be a part of the first jaw (3) (see figures 1E, 1H, 2E, 2H, 3E, 4E and 4H).

[0055] Likewise, the second abutting element (21) can preferably be a part of the second jaw (4) (see figures 1E, 2E, 3E, 3H and 4E).

[0056] The first abutting element (20) preferably comprises a fifth rotatable roller (67) which is rotatable with respect to an axis that is substantially perpendicular to the base (2). In this way, during the passage from the first unhooked configuration of the ski boot (S1) to the first hooked configuration of the ski boot (A1), and vice versa, and during the passage from the first hooked configuration of the ski boot (A1) to the second unhooked configuration of the ski boot (S2), e vice versa, the fifth rotatable roller (67) rolls along the pusher member (22), reducing the friction forces to a minimum and, at the same time, facilitating the repositioning of the first jaw (3) in the position that it assumes in the first hooked configuration (A1) of the ski boot, after the second unhooked configuration of the ski boot (S2) has been reached (see in particular figures 1H, 2H, 3H and 4H).

[0057] Alternatively, the first abutting element (20) can be a cylindrical element fixed to the first jaw (3), or it can be in a single body with the first jaw (3).

[0058] Likewise, the second abutting element (21) preferably comprises a sixth rotatable roller (68) which is rotatable with respect to an axis that is substantially perpendicular to the base (2). In this way, during the passage from the first unhooked configuration of the ski boot (S1) to the first hooked configuration of the ski boot (A1), and vice versa, and during the passage from the first hooked configuration of the ski boot (A1) to the second unhooked configuration of the ski boot (S2), and vice versa, the sixth rotatable roller (68) rolls along the pusher member (22), reducing the friction forces to a minimum and, at the same time, facilitating the repositioning of the second jaw (4) in the position that it assumes in the first hooked configuration (A1) of the ski boot, after the second unhooked configuration of the ski boot (S2) has been reached (see in particular figures 1H, 2H, 3H and 4H).

[0059] Alternatively, the second abutting element (21) can be a cylindrical element fixed to the second jaw (4), or it can be in a single body with the second jaw (4).

[0060] The first seat (23) and the second seat (24) are dimensioned and designed in order to adapt to the dif-

ferent dimensions of the ski boot.

[0061] With particular reference to figures 1E, 2E, 3E and 4E, the first seat (23) is preferably concave. Likewise, the second seat (24) is preferably concave.

[0062] Alternatively, in an embodiment that is not illustrated, the first seat (23) can be V- or L-shaped. Likewise, the second seating (24) can be V- or L-shaped.

[0063] In a further embodiment, not illustrated, the first seating (23) and the second seating (24) can be adjacent and consecutive, so as to constitute a prolongation of the other.

[0064] Further, the pusher member (22) preferably comprises: a first wall (25) which is adjacent to the first seating (23), which is more external with respect to the first seating (23), which is facing outwards and which is inclined with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, to push the first abutting element (20) and thus draw the first jaw (3) along the third run of the first guide (7), guaranteeing the reaching of the second unhooked configuration of the ski boot (S2), after a first transversal force and directed outwardly, which exceeds the first threshold value, has urged the first jaw (3); a second wall (26) which is adjacent to the second seating (24), which is more external with respect to the second seating (24), which is facing outwards and which is inclined with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, to push the second abutting element (21) and thus draw the second jaw (4) along the fourth run, guaranteeing the reaching of the second unhooked configuration of the ski boot (S2), after a second transversal force and directed outwardly, which exceeds the second threshold value, has urged the second jaw (4) (see figures 1E, 2E, 3E and 4E).

[0065] The conformation of the first wall (25) and the second wall (26), in particular the inclination thereof, is advantageously such as to guarantee that, once the first abutting element (20), subjected to a first transversal force directed outwardly, reaches the first wall (25) and/or the second abutting element (21), subjected to a second transversal force and directed outwardly, reaches the second wall (26), then the first wall (25) and/or the second wall (26) act/s on the first abutting element (20) and/or on the second abutting element (21) by transmitting a force having a transversal component directed towards the outside which will be added to the first transversal force directed towards the outside and/or the second transversal force directed towards the outside, thus contributing to push the first abutting element (20) and/or the second abutting element (21) along the third run and/or the fourth run up to reaching the second unhooked configuration of the ski boot (S2).

[0066] In other words, the first wall (25) and the second wall (26) advantageously guarantee the reaching of the second unhooked configuration of the ski boot (S2) each time the toe-piece of the ski binding (1) or the ski boot is subjected to a transversal force directed towards the outside, greater than the first threshold value and/or the second threshold value, thus safeguarding the skier from

injury. In fact, once a limit position abutment element has been exceeded, at which the first contact with the first abutting element (20) and/or the second abutting element (21) takes place with the first wall (25) and/or with the second wall (26), the first abutting element (20) and/or the second abutting element (21) running along the first guide (7) and/or the second guide (10) can no longer return to take on the first stable balanced position (E1) and/or the second stable balanced position (E2) but are inevitably induced to perform the third run and/or the fourth run reaching the second unhooked configuration ski boot (S2).

[0067] The pusher member (22) preferably comprises: a central body (48); a first wing (49) which bears the first seating (23) and the first wall (25); and a second wing (50), opposite the first wing (49), which bears the second seating (24) and the second wall (26) (see figures 1E, 2E, 3E and 4E).

[0068] Still with reference to figures 1E, 2E, 3E and 4E, the first wall (25) is preferably consecutive to the first seating (23). Alternatively, the second wall (26) is preferably consecutive to the second seating (24).

[0069] With particular reference to figures 1E, 2E, 3E and 4E, the first seating (23) preferably comprises: a third wall (51) which is facing outwards and which is inclined with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski; and a fourth wall (52) which is facing inwards and which is inclined with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski. Still with reference to figures 1E, 2E, 3E and 4E, the third wall (51) and the fourth wall (52) intersect one another at a rounded angle in order to receive the first abutting element (20) when the first jaw (3) assumes the first stable balanced position (E1).

[0070] With reference to figures 1E, 2E, 3E and 4E, the second seating (24) preferably comprises: a fifth wall (53) which is facing outwards and which is inclined with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski; and a sixth wall (54) which is facing inwards and which is inclined with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski. Still with reference to figures 1E, 2E, 3E and 4E, the fourth wall (52) and the fifth wall (53) intersect one another at a rounded angle in order to receive the second abutting element (21) when the second jaw (34) assumes the second stable balanced position (E2).

[0071] With particular reference to figures 1H, 2H, 3H and 4H, the first sliding element (14) preferably comprises the, or is identifiable as the, first abutting element (20) and wherein the third sliding element (17) comprises, or is identifiable as, the second abutting element (21).

[0072] The toe-piece of the ski binding (1) will advantageously comprise a smaller number of components, with all the advantages that follow in terms of reduction of the volumes, compactness and simplicity of realisation of the toe-piece of the ski binding (1).

[0073] Preferably, with particular reference to figures 1B, 1D, 1F, 1H, 2B, 2D, 2F, 2H, 3B, 3D, 3F, 3H, 4B, 4D,

4F and 4H the first sliding element (14) is arranged closer to the longitudinal axis of the ski, when the base (2) is fixed to the ski, with respect to the second sliding element (15), and the third sliding element (17) is arranged closer to the longitudinal axis of the ski, when the base (2) is fixed to the ski, with respect to the fourth sliding element (18).

[0074] The first jaw (3) is preferably provided with a first recess (27) for accommodating a first portion (28) of the pusher member (22) which comprises at least the first wall (25); the first recess (27) and the second sliding element (15) are arranged at different heights to one another, in order to prevent the second sliding element (15) from obstructing the pusher member (22) (see figures 1H, 2H, 3H and 4H). Further, the second jaw (4) is preferably provided with a second recess (29) for accommodating a second portion (30) of the pusher member (22) which comprises at least the second wall (26); the second recess (29) and the fourth sliding element (18) are arranged at different heights to one another, in order to prevent the fourth sliding element (18) from obstructing the pusher member (22) (see figures 1H, 2H, 3H and 4H).

[0075] The reciprocal arrangement of the first recess (27) and the second sliding element (15) as well as the second recess (29) and the fourth sliding element (18) is preferably such as to best exploit the spaces and reduce the volumes and weights, thus guaranteeing the compactness and lightness of the toe-piece of the ski binding (1).

[0076] In detail, when the base (2) is fixed to the ski and the ski is arranged on a horizontal plane, then the first recess (27) is preferably arranged at a greater height with respect to the second sliding element (15). Likewise, when the base (2) is fixed to the ski and the ski is arranged on a horizontal plane, then the second recess (29) is preferably arranged at a greater height with respect to the fourth sliding element (18).

[0077] The first portion (28) of the pusher member (22) preferably also comprises the first seating (23) and likewise the second portion (30) also comprises the second seating (24), see for example figures 1E, 3E (only with reference to the second portion (30)), and 4E.

[0078] The stabilising means (19) preferably further comprise elastic means (31) which are interposed between the base (2) and the pusher member (22) to push the pusher member (22) along the longitudinal axis of the ski, when the base (2) is fixed to the ski (see figures 1E, 1G, 1L, 2E, 2G, 2L, 3E, 3G, 3L, 4E, 4G and 4L). By appropriately selecting, and/or pre-loading, the elastic means (31), the first threshold value and the second threshold value can advantageously be set so as to protect the skier from injury.

[0079] Alternatively, magnetic means, not illustrated, could be used instead of the elastic means (31).

[0080] In the embodiment illustrated in figures 1E, 1G, 1L, 2E, 2G, 2L, 3E, 3G, 3L, 4E, 4G and 4L, the elastic means (31) comprise a pre-compressed spring (55), which is regulated by means of an adjustment screw (56)

so as to define the first threshold value and the second threshold value.

[0081] The toe-piece of a ski binding (1) preferably comprises activating means (32) which are designed to act on the first jaw (3) and on the second jaw (4) at least so as to induce the toe-piece of the ski binding (1) to pass from the first hooked configuration of the ski boot (A1) to the first unhooked configuration of the ski boot (S1) and vice versa (see figures 1A, 1B, 1I, 1L, 2A, 2B, 2I, 2L, 3A, 3B, 3I, 3L, 4A, 4B, 4I and 4L).

[0082] The toe-piece of the ski binding (1) preferably further comprises: a third abutting element (33) which is borne by first jaw (3); and a fourth abutting element (34) which is borne by the second jaw (4) (see figures 1G, 1H, 1I, 2G, 2H, 2I, 3G, 3H, 3I, 4G, 4H and 4I). Further, the activating means (32) preferably comprise a cursor (35) which is mobile along the longitudinal axis of the ski, when the base (2) is fixed to the ski, at least between a first position (P1) and a second position (P2), and which comprises a first contact profile (36) for contacting the third abutting element (33) and a second contact profile (37) for contacting the fourth abutting element (34). The conformation and availability of the first contact profile (36) of the cursor (35), of the pusher member (22) and of the third abutting element (33) and the conformation and availability of the second contact profile (37) of the cursor (35), of the pusher member (22) and of the fourth abutting element (34) is such that the movement of the cursor (35) from the first position (P1) to the second position (P2) enables the toe-piece of the ski binding (1) to pass respectively from the first unhooked configuration of the ski boot (S1) to the first hooked configuration of the ski boot (A1), and the movement of the cursor (35) from the second position (P2) to the first position (P1) induces the passage of the toe-piece for the ski binding (1) from the first hooked configuration of the ski boot (A1) to the first unhooked configuration of the ski boot (S1) (see figures 1G, 1I, 2G, 2I, 3G, 3I, 4G and 4I).

[0083] The conformation and arrangement of the first contact profile (36) of the cursor (35), of the pusher member (22) and of the third abutting element (33) and of the second contact profile (37) of the cursor (35), of the pusher member (22) and of the fourth abutting element (34) advantageously enables easily passing from the first unhooked configuration of the ski boot (S1) to the first hooked configuration of the ski boot (A1), and vice versa, by moving only the cursor (35).

[0084] The third abutting element (33) can preferably be a part of the first jaw (3) (see figures 1H, 2H, and 4H).

[0085] The fourth abutting element (34) can preferably be a part of the second jaw (4) (see figure 3H).

[0086] In detail, the third abutting element (33) can be a seventh rotatable roller (69) borne rotatably by the first jaw (3), as in the illustrated embodiment (see figures 1G, 1H, 2G, 2H, 3G, 4G and 4H), or it can be a cylindrical element fixed to the first jaw (3), or can be in a single body with the first jaw (3).

[0087] Likewise, the fourth abutting element (34) can

be an eighth rotatable roller (70) rotatably borne by the first jaw (3), as in the embodiment illustrated (see figures 1G, 2G, 3G, 3H and 4G), or it can be a cylindrical element fixed to the second jaw (4), or can be in a single body with the second jaw (4).

[0088] The cursor (35) is preferably slidably interposed between the pusher member (22) and the base (2).

[0089] The cursor (35) and the second sliding element (15) are preferably arranged at different heights to one another, in order to prevent the second sliding element (15) from obstructing the cursor (35) (see figures 1H, 2H, 3H, 4H, 1G, 2G, 3G and 4G).

[0090] Likewise, the cursor (35) and the fourth sliding element (18) are preferably arranged at different heights to one another, in order to prevent the fourth sliding element (18) from obstructing the cursor (35) (see figures 1H, 2H, 3H, 4H, 1G, 2G, 3G and 4G).

[0091] Further, the first sliding element (14) preferably comprises, or is identifiable the third abutting element (33) and wherein the third sliding element (17) comprises the, or is identifiable as the, fourth abutting element (34) (see figures 1H, 2H, 3H and 4H).

[0092] The toe-piece of the ski binding (1) will advantageously comprise a smaller number of components, with all the advantages that follow in terms of reduction of the volumes, compactness and simplicity of realisation of the toe-piece of the ski binding (1).

[0093] With particular reference to the embodiment illustrated in the figures (see for example figures 1H, 1I, 2H, 2I, 3I, 3H, 4H, and 4I), the cursor (35) and the pusher member (22) are preferably arranged at different heights and different with respect to the height at which the first guide (7) and the second guide (10) are arranged.

[0094] This particular configuration advantageously enables best exploiting the thickness of the toe-piece of the ski binding (1) and reducing the number of elements constituting the toe-piece of the ski binding (1). In fact, the first guide (7), the pusher member (22) and the cursor (35) are arranged in such a way as to be able to interact, at planes arranged at different heights, with a single element, which functions as the first sliding element (14), as the first abutting element (20) and as the third abutting element (33). Likewise, the second guide (10), the pusher member (22) and the cursor (35) are arranged in such a way as to be able to interact, at planes arranged at different heights, with a single element, which functions as the third sliding element (17), as the second abutting element (21) and as the fourth abutting element (34). In this way the number of components constituting the toe-piece of the ski binding (1) will be reduced, making it more compact.

[0095] In detail, when the base (2) is fixed to the ski and the ski is arranged on a horizontal plane, then the pusher member (22) is preferably arranged at a greater height with respect to the cursor (35), which in turn is arranged at a greater height than the first guide (7) and the second guide (10) (see for example figures 1H, 1I, 2H, 2I, 3H, 3I, 4H and 4I).

[0096] The cursor (35) is preferably mobile so as also to reach a third position (P3). The first contact profile (36) and the second contact profile (37) are conformed in such a way that when the cursor (35) reaches the third position (P3), the first contact profile (36) blocks the movement of the third abutting element (33), and thus of the first jaw (3) along the first guide (7), and the second contact profile (37) blocks the movement of the fourth abutting element (34), and thus of the second jaw (4) along the second guide (10). The toe-piece of the ski binding (1) is configured so as to assume a second hooked configuration of the ski boot (A2), for hooking the tip of a ski boot, wherein the first pin (5) and the second pin (6) are located away from one another by the first distance, which second hooked configuration of the ski boot (A2) is obtained starting from the first hooked configuration of the ski boot (A1) by moving the cursor (35) from the second position (P2) to the third position (P3).

[0097] The toe-piece of the ski binding (1) of the invention is advantageously configured in such a way that it can be used for ski mountaineering, by enabling the blocking of the toe-piece of the ski binding (1) when for example it is necessary to carry out uphill portions.

[0098] The second hooked configuration of the ski boot (A2) is, in fact, the configuration that the toe-piece of the ski binding (1) can assume when the skier is to perform uphill portions.

[0099] The second hooked configuration of the ski boot (A2) could also be obtained starting from the first hooked configuration of the ski boot (A1), passing through the first unhooked configuration of the ski boot (A1).

[0100] With particular reference to figures 1G, 2G, 3G and 4G, the first contact profile (36) preferably comprises: a first sliding wall (57) for abutting the third abutting element (33) until the cursor (35) assumes the second position (P2); a first blocking wall (58) for receiving the third abutting element (33) and blocking it until the cursor (35) assumes the first position (P1); and a second blocking wall (59) for receiving the third abutting element (33) and blocking it until the cursor (35) assumes the third position (P3).

[0101] With particular reference to figures 1G, 2G, 3G and 4G, the second profiled contact element (37) preferably comprises a second sliding wall (60) for abutting the fourth abutting element (34) until the cursor (35) assumes the second position (P2); a third blocking wall (61) for receiving the fourth abutting element (34) and blocking it until the cursor (35) assumes the first position (P1); and a fourth blocking wall (62) for receiving the fourth abutting element (34) and blocking it until the cursor (35) assumes the third position (P3).

[0102] The activating means (32) preferably comprise a manual lever (38) which is connected to the cursor (35) in order to move the cursor (35) at least from the first position (P1) to the second position (P2), and a button (39) which is connected to the cursor (35) in order to move the cursor (35) from the first position (P1) to the second position (P2) and which is arranged so as to be

pressed by the ski boot.

[0103] It will advantageously be very simple for the skier to pass from one configuration to another of the toe-piece of the ski binding (1), simply by rotating the manual lever (38), or pressing the button (39) with the ski boot. In detail, during the passage from the first unhooked configuration of the ski boot (S1) to the first hooked configuration of the ski boot (A1), the skier will only have to press the button (39) which will consequently move the cursor (35) in order to move the cursor (35) from the first position (P1) to the second position (P2); in order to pass from the first hooked configuration of the ski boot (A1) to the first unhooked configuration of the ski boot (S1) it will be sufficient to rotate the manual lever (38) in a first rotation direction (i.e. in an anticlockwise direction, compare figures 1A, 1B, 1I and 1L with figures 2A, 2B, 2I and 2L) in order to activate the cursor (35) to move from the second position (P2) to the first position (P1); and in order to pass from the first hooked configuration of the ski boot (A1) to the second hooked configuration of the ski boot (A2) it will be sufficient to rotate the manual lever (38) in a second rotation direction, opposite the first rotation direction (i.e. in a clockwise direction, compare figures 1A, 1B, 1I and 1L with figures 4A, 4B, 4I and 4L) in order to activate the cursor (35) to move from the second position (P2) to the third position (P3).

[0104] In detail, with particular reference to figures 1I, 2I, 3I and 4I, the manual lever (38) is rotatably connected to the cursor (35) by means of a pin (71) perpendicular to the longitudinal axis of the ski, when the base (2) is fixed to the ski, so that by rotating the manual lever (38) in the first rotation direction the cursor (35) can pass from the third position (P3), to the second position (P2) and/or to the first position (P1) while by rotating the manual lever (38) in the second rotation direction the cursor (35) can pass from the third position (P1), to the second position (P2) and/or to the first position (P3).

[0105] With particular reference to figures 1L, 2L, 3L and 4L, the cursor (35) is connected to the button (39) by means of a connecting element (72) which is arranged and conformed in such a way as to push the cursor (35) by moving it towards the front part of the ski along the longitudinal axis of the ski, when the base (2) is fixed to the ski, from the first position (P1) and a second position (P2) each time the button (39) is pressed.

[0106] With particular reference to figures 1I, 2I, 3I and 4I the base (2) bears, in the front part of the ski, when the base (2) is fixed to the ski, a blocking seating (73) and the end of the cursor (35) which is at the front part of the ski, when the base (2) is fixed to the ski, is preferably conformed so as to slide along the blocking seating (73) so as to be able to assume, with respect to the blocking seating (73), a first blocking position (B1), when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1) and the cursor (35) assumes the second position (P2), and a second blocking position (B2), when the toe-piece of the ski binding (1) is in the second hooked configuration of the ski boot (A2) and the

cursor (35) assumes the third position (P3).

[0107] It will be advantageously possible to block the toe-piece of the ski binding (1) with more certainty.

[0108] There follows a functional description of the toe-piece of a ski binding (1) of the present invention.

[0109] Figures 2A-2L illustrate the first unhooked configuration of the ski boot (S1), i.e. the configuration in which the toe-piece of the ski binding (1) is ready to receive a ski boot. In the first unhooked configuration of the ski boot (S1): the first pin (5) and the second pin (6) are located away from one another by a second distance, which is such as to enable the insertion of the ski boot between them; the button (39) is raised and the manual lever (38) is lowered so that the cursor (35) assumes the first position (P1) in which it abuts the third abutting element (33) (which in the preferred illustrated embodiment is the first sliding element (14)) at the first blocking wall (58) and the fourth abutting element (34) (which in the preferred illustrated embodiment is the third sliding element (17)) at the third blocking wall (61). Further, in the first unhooked configuration of the ski boot (S1) the first sliding element (14) is located in the first portion (8) of the first guide (7); the third sliding element (17) is located in the third portion (11) of the second guide (10); the elastic means (31) push the pusher member (22) along the longitudinal axis of the ski towards the rear part of the ski, when the base (2) is fixed to the ski; and the pusher member (22), in turn, pushes against the first jaw (3), by means of the first abutting element (20) (which in the preferred illustrated embodiment is the first sliding element (14)), and against the second jaw (4), via the second abutting element (21) (which in the preferred illustrated embodiment is the third sliding element (17)). However, notwithstanding the force exerted by the pusher member (22), the first jaw (3) and the second jaw (4) maintain the position thereof by means of the first blocking wall (58) and of the third blocking wall (61) which prevent the third abutting element (33) and the fourth abutting element (34) from moving along the transversal direction to the longitudinal axis of the ski, when the base (2) is fixed to the ski, and the constraint provided by the first guide (7) and the second guide (10) on the first sliding element (14) and on the third sliding element (17) along the direction of the longitudinal axis of the ski, when the base (2) is fixed to the ski.

[0110] Figures 1A-1L illustrate the first unhooked configuration of the ski boot (A1) having been reached, starting from the first hooked configuration of the ski boot (S1), after the skier has positioned the ski boot so as to press on the button (39), so as to induce, by means of the connecting element (72), a displacement of the cursor (35) towards the front part of the ski, when the base (2) is fixed to the ski, up to assuming the second position (P2), in which the cursor (35) contacts the third abutting element (33) at the first sliding wall (57) and the fourth abutting element (34) at the second sliding wall (60). In the second position (P2) the cursor (35) thus enables the third abutting element (33) and the fourth abutting ele-

ment (34), when the blocking action exerted thereon by the first blocking wall (58) and the third blocking wall (61) has been removed, to move, drawing the first jaw (3) and the second jaw (4), respectively, along the first sliding wall (57) and the second sliding wall (60), then towards the longitudinal axis of the ski, when the base (2) is fixed to the ski, and along the longitudinal axis of the ski towards the rear part of the ski, when the base (2) is fixed to the ski. However, this last movement along the longitudinal axis of the ski towards the rear part of the ski, when the base (2) is fixed to the ski, is prevented by the constraint provided in that direction by the first guide (7) and the second guide (10); in fact, in this configuration, the first sliding element (14) and the third sliding element (17) stay, respectively, in the first portion (8) of the first guide (7) and the third portion (11) of the second guide (10), preventing the movement of the first jaw (3) and of the second jaw (4) along the direction of the longitudinal axis of the ski, when the base (2) is fixed to the ski, and enabling only the movement towards the longitudinal axis of the ski, when the base (2) is fixed to the ski. The displacement of the first jaw (3), and thus of the first abutting element (20), and the second jaw (4), and then of the second abutting element (21) towards the longitudinal axis of the ski, when the base (2) is fixed to the ski, it enables the pusher member (22), under the effect of the force exerted by the elastic means (31), to translate along the direction of the longitudinal axis of the ski towards the rear part of the ski, when the base (2) is fixed to the ski, up to receiving the first abutting element (20) and the second abutting element (21) respectively at the first seat (23) and the second seat (24), so that the first jaw (3) and the second jaw (4) respectively assume the first stable balanced position (E1) and the second stable balanced position (E2). Once the first hooked configuration of the ski boot (A1) has been reached, the first pin (5) and the second pin (6) will be located away from one another by a first distance, so as to keep the ski boot blocked and the end of the cursor (35) that is at the front part of the ski, when the when the base (2) is fixed to the ski, assumes the first blocking position (B1).

[0111] Figures 3A-3L illustrate the second unhooked configuration of the ski boot (S2) reached, starting from the first hooked configuration of the ski boot (A1), after the first jaw (3) and/or the second jaw (4) is/are subjected to a first transversal force and directed outwards and/or to a second transversal force and directed outwards that is greater than the first threshold value and/or the second threshold value.

[0112] Consider for example the case in which the first jaw (3) is urged by a first transversal force and directed outwards: the first force would tend to induce the first abutting element (20), which was located at the first seat (23), and the first sliding element (14) (which is identified by the first abutting element (20)), which is located in the first portion (8) of the first guide (7), to move away with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, moving, respectively, along the

fourth wall (52) of the pusher member (22) and the first portion (8) of the first guide (7), drawing the first jaw (3) in movement. This movement is contrasted by the action transmitted by the pusher member (22) to the first abutting element (20), while it is moving along the fourth wall (52), and in particular by the transversal component with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, of that action, which will be directed inwards and therefore is opposite the first transversal force. If the first transversal force has an intensity that is such as to overcome the transversal component of the force exerted by the pusher member (22) on the first abutting element (20) at the fourth wall (52), then the first abutting element (20) will run along all the fourth wall (52) up to arriving at the first wall (25), thus making the unhooking of the first jaw (3) and the reaching of the second unhooked configuration of the ski boot (S2). In fact, the first wall (25), given its inclination, acts on the first abutting element (20) and transmits a force having a transversal component directed towards the outside which will be added to the first transversal force thus contributing to push the first abutting element (20) along the third run up to reaching the second unhooked configuration of the ski boot (S2).

[0113] Once the second unhooked configuration of the ski boot (S2) has been reached, in order to newly utilise the toe-piece of the ski binding (1), the skier will only have to act manually on the first jaw (3) so as to force the first jaw to travel along the first guide (7), returning to the first unhooked configuration of the ski boot (S1) or the first hooked configuration of the ski boot (A1).

[0114] A like behaviour takes place in a case where a second transversal force directed outwardly is applied to the second jaw (4).

[0115] Figures 4A-4L illustrate the second hooked configuration of the ski boot (A2) reached, starting from the first hooked configuration of the ski boot (A1) simply by rotating the manual lever (38) in the clockwise direction and thus inducing a movement of the cursor (35) towards the front part of the ski, when the base (2) is fixed to the ski, up to assuming the third position (P3), in which the cursor (35) embraces the third abutting element (33) at the second blocking wall (59) and the fourth abutting element (34) at the fourth blocking wall (62), opposing the movement of the third abutting element (33) and the fourth abutting element (34), and thus of the first jaw (3) and the second jaw (4). Further, the first sliding element (14) and the third sliding element (17) stay, respectively, in the first portion (8) of the first guide (7) and the third portion (11) of the second guide (10), preventing the movement of the first sliding element (14) and therefore of the first jaw (3), and of the third sliding element (17), and thus of the second jaw (4), along the direction of the longitudinal axis of the ski, when the base (2) is fixed to the ski. Further, the maintaining of the position is guaranteed by the fact that the end of the cursor (35) that is at the front part of the ski, when the when the base (2) is fixed to the ski, assumes the second blocking position

(B2).

[0116] It is understood that the above has been described by way of non-limiting example and that any constructional variants are considered 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), comprising:

a base (2) which is fixable to a ski;
 a first jaw (3);
 a second jaw (4);
 a first pin (5) for inserting in a first lateral hole fashioned in the tip of a ski boot, which first pin (5) is borne by the first jaw (3);
 a second pin (6) for inserting in a second lateral hole opposite the first lateral hole fashioned in the tip of the ski boot, which second pin (6) is borne by the second jaw (4);
 a first guide (7) which is borne by the base (2), which has a first portion (8) which extends away from the longitudinal axis of the ski, when the base (2) is fixed to the ski, and which has a second portion (9), following the first portion (8), which extends towards the front part of the ski, when the base (2) is fixed to the ski;
 a second guide (10) which is borne by the base (2), which has a third portion (11) which extends away from the longitudinal axis of the ski, when the base (2) is fixed to the ski, and which has a fourth portion (12), following the third portion (11), which extends towards the front part of the ski, when the base (2) is fixed to the ski;
 a first couple of sliding elements (13) which is borne by the first jaw (3) and which is formed by a first sliding element (14) and a second sliding element (15), which first sliding element (14) and second sliding element (15) slidably engage, one following the other, along the first guide (7);
 a second couple of sliding elements (16) which is borne by the second jaw (4) and which is formed by a third sliding element (17) and a fourth sliding element (18), which third sliding element (17) and fourth sliding element (18) slidably engage, one following the other, along the second guide (10);
 wherein the toe-piece of the ski binding (1) is configured so as to assume:

a first hooked configuration of the ski boot (A1), for hooking the tip of a ski boot, wherein the first pin (5) and the second pin (6) are located away from one another by a first distance, wherein the first sliding element (14) and the second sliding element (15) are lo-

cated in the first portion (8) of the first guide (7), wherein the third sliding element (17) and the fourth sliding element (18) are located in the third portion (11) of the second guide (10);

a first unhooked configuration of the ski boot (S1), for unhooking the tip of a ski boot, which first unhooked configuration of the ski boot (S1) is obtained starting from the first hooked configuration of the ski boot (A1) after the first couple of sliding elements (13) has carried out a first run along the first guide (7) and the second couple of sliding elements (16) has carried out a second run along the second guide (10), so that the first pin (5) and the second pin (6) reach a second distance that is greater than the first distance;

a second unhooked configuration of the ski boot (S2), for unhooking the tip of a ski boot, which second unhooked configuration of the ski boot (S2) is obtained starting from the first hooked configuration of the ski boot (A1) after the at least one from between the first couple of sliding elements (13) and the second couple of sliding elements (16) has carried out a third run and/or a fourth run, longer than the first run and second run, respectively along the first guide (7) and/or the second guide (10), wherein at least one from between the first sliding element (14) and the second sliding element (15) of the first couple of sliding elements (13) is arranged in the second portion (9) of the first guide (7) and/or wherein at least one from between the third sliding element (17) and the fourth sliding element (18) of the second couple of sliding elements (16) is arranged in the fourth portion (12) of the second guide (10), so that the first pin (5) and the second pin (6) reach a third distance and so that the first pin (5) and/or the second pin (6) is/are orientated obliquely with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, so that the tip of the ski boot can move away transversally with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski.

2. The toe-piece of a ski binding (1) of the preceding claim, wherein:

it comprises stabilising means (19) which are configured so as to maintain the toe-piece of the ski binding (1) in the first hooked configuration of the ski boot (A1) when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1);

- it is configured in such a way that starting from the first hooked configuration of the ski boot (A1), when a first transversal force directed outwardly, which exceeds a first threshold value, acts on the first jaw (3) then the first couple of sliding elements (13) performs the third run along the first guide (7) and at least one from between the first sliding element (14) and the second sliding element (15) of the first couple of sliding elements (13) is arranged in the second portion (9) of the first guide (7), so that the toe-piece of the ski binding (1) reaches the second unhooked configuration of the ski boot (S2); it is configured in such a way that starting from the first hooked configuration of the ski boot (A1), when a second transversal force directed outwardly, which exceeds a second threshold value, acts on the second jaw (4), then the second couple of sliding elements (16) carries out the fourth run along the second guide (10) and wherein at least one from between the third sliding element (17) and the fourth sliding element (18) of the second couple of sliding elements (16) is arranged in the fourth portion (12) of the second guide (10), so that the toe-piece of the ski binding (1) reaches the second unhooked configuration of the ski boot (S2).
3. The toe-piece of a ski binding (1) of the preceding claim, wherein:
the stabilising means (19) are designed so as to press against the first jaw (3) and against the second jaw (4) at least when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1), so that the first jaw (3) assumes a first stable balanced position (E1) along the first guide (7) or tends to reach the first stable balanced position (E1) after the first transversal force and directed outwardly, smaller than the first threshold value, has urged the first jaw (3), so that the second jaw (4) assumes a second stable balanced position (E2) along the second guide (10) or tends to reach the second stable balanced position (E2) after the second transversal force and directed outwardly, smaller than the second threshold value, has urged the second jaw (4).
4. The toe-piece of a ski binding (1) of the preceding claim, wherein:
it comprises a first abutting element (20) which is borne by the first jaw (3);
it comprises a second abutting element (21) which is borne by the second jaw (4);
the stabilising means (19) comprise a pusher member (22) so as to press against the first jaw (3) and against the second jaw (4), which pusher member (22) acts along the longitudinal axis of the ski, when the base (2) is fixed to the ski, and comprises a first seating (23) conformed to receive the first abutting element (20) at least when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1), so that the first jaw (3) can assume the first stable balanced position (E1), and a second seating (24) having a shape conformed such as to receive the second abutting element (21) at least when the toe-piece of the ski binding (1) is in the first hooked configuration of the ski boot (A1), so that the second jaw (4) can assume the second stable balanced position (E2).
5. The toe-piece of a ski binding (1) of the preceding claim, wherein the pusher member (22) comprises: a first wall (25) which is adjacent to the first seating (23), which is more external with respect to the first seating (23), which is facing outwards and which is inclined with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, to push the first abutting element (20) and thus draw the first jaw (3) along the third run of the first guide (7), guaranteeing the reaching of the second unhooked configuration of the ski boot (S2), after a first transversal force and directed outwardly, which exceeds the first threshold value, has urged the first jaw (3); a second wall (26) which is adjacent to the second seating (24), which is more external with respect to the second seating (24), which is facing outwards and which is inclined with respect to the longitudinal axis of the ski, when the base (2) is fixed to the ski, to push the second abutting element (21) and thus draw the second jaw (4) along the fourth run, guaranteeing the reaching of the second unhooked configuration of the ski boot (S2), after a second transversal force and directed outwardly, which exceeds the second threshold value, has urged the second jaw (4).
6. The toe-piece of a ski binding (1) of the preceding claim, wherein the first sliding element (14) is arranged closer to the longitudinal axis of the ski, when the base (2) is fixed to the ski, with respect to the second sliding element (15), and wherein the third sliding element (17) is arranged closer to the longitudinal axis of the ski, when the base (2) is fixed to the ski, with respect to the fourth sliding element (18).
7. The toe-piece of a ski binding (1) of the preceding claim, wherein:
the first jaw (3) is provided with a first recess (27) for accommodating a first portion (28) of the pusher member (22) which comprises at least the first wall (25); the first recess (27) and the second sliding element (15) are arranged at different heights to one another, in order to prevent the second sliding element (15) from obstructing the pusher member (22); the second jaw (4) is provided with a second recess

(29) for accommodating a second portion (30) of the pusher member (22) which comprises at least the second wall (26); the second recess (29) and the fourth sliding element (18) are arranged at different heights to one another, in order to prevent the fourth sliding element (18) from obstructing the pusher member (22).

8. The toe-piece of a ski binding (1) of any one of the preceding claims from 4 to 7, wherein the first sliding element (14) comprises the, or is identifiable as the, first abutting element (20) and wherein the third sliding element (17) comprises the, or is identifiable as the, second abutting element (21).

9. The toe-piece of a ski binding (1) of any one of the preceding claims from 4 to 8, wherein the stabilising means (19) further comprise elastic means (31) which are interposed between the base (2) and the pusher member (22) to push the pusher member (22) along the longitudinal axis of the ski, when the base (2) is fixed to the ski.

10. The toe-piece of a ski binding (1) of any one of the preceding claims from 4 to 9, comprising activating means (32) which are designed to act on the first jaw (3) and on the second jaw (4) at least so as to induce the toe-piece of the ski binding (1) to pass from the first hooked configuration of the ski boot (A1) to the first unhooked configuration of the ski boot (S1) and vice versa.

11. The toe-piece of a ski binding (1) of the preceding claim, wherein:

it comprises a third abutting element (33) which is borne by the first jaw (3);
it comprises a fourth abutting element (34) which is borne by the second jaw (4);
the activating means (32) comprise a cursor (35) which is mobile along the longitudinal axis of the ski, when the base (2) is fixed to the ski, at least between a first position (P1) and a second position (P2), and which comprises a first contact profile (36) for contacting the third abutting element (33) and a second contact profile (37) for contacting the fourth abutting element (34);
the conformation and availability of the first contact profile (36) of the cursor (35), of the pusher member (22) and of the third abutting element (33) and the conformation and availability of the second contact profile (37) of the cursor (35), of the pusher member (22) and of the fourth abutting element (34) is such that the movement of the cursor (35) from the first position (P1) to the second position (P2) enables the toe-piece of the ski binding (1) to pass respectively from the first unhooked configuration of the ski boot (S1)

to the first hooked configuration of the ski boot (A1), and the movement of the cursor (35) from the second position (P2) to the first position (P1) induces the passage of the toe-piece for the ski binding (1) from the first hooked configuration of the ski boot (A1) to the first unhooked configuration of the ski boot (S1).

12. The toe-piece of a ski binding (1) of the preceding claim, wherein:

the cursor (35) is mobile so as also to reach a third position (P3);
the first contact profile (36) and the second contact profile (37) are conformed in such a way that when the cursor (35) reaches the third position (P3), the first contact profile (36) blocks the movement of the third abutting element (33), and thus of the first jaw (3) along the first guide (7), and the second contact profile (37) blocks the movement of the fourth abutting element (34), and thus of the second jaw (4) along the second guide (10);

the toe-piece of the ski binding (1) is configured so as to assume a second hooked configuration of the ski boot (A2), for hooking the tip of a ski boot, wherein the first pin (5) and the second pin (6) are located away from one another by the first distance, which second hooked configuration of the ski boot (A2) is obtained starting from the first hooked configuration of the ski boot (A1) by moving the cursor (35) from the second position (P2) to the third position (P3).

13. The toe-piece of a ski binding (1) of claim 11 or 12, wherein the first sliding element (14) comprises, or is identifiable as, the third abutting element (33) and wherein the third sliding element (17) comprises, or is identifiable as, the fourth abutting element (34).

14. The toe-piece of a ski binding (1) of any one of the preceding claims from 10 to 13, wherein the activating means (32) comprise a manual lever (38) which is connected to the cursor (35) in order to move the cursor (35) at least from the first position (P1) to the second position (P2), and a button (39) which is connected to the cursor (35) in order to move the cursor (35) from the first position (P1) to the second position (P2) and which is arranged so as to be pressed by the ski boot.

15. The toe-piece of a ski binding (1) of any one of the preceding claims, wherein the first guide (7) is a curved guide and the second guide (10) is a curved guide.

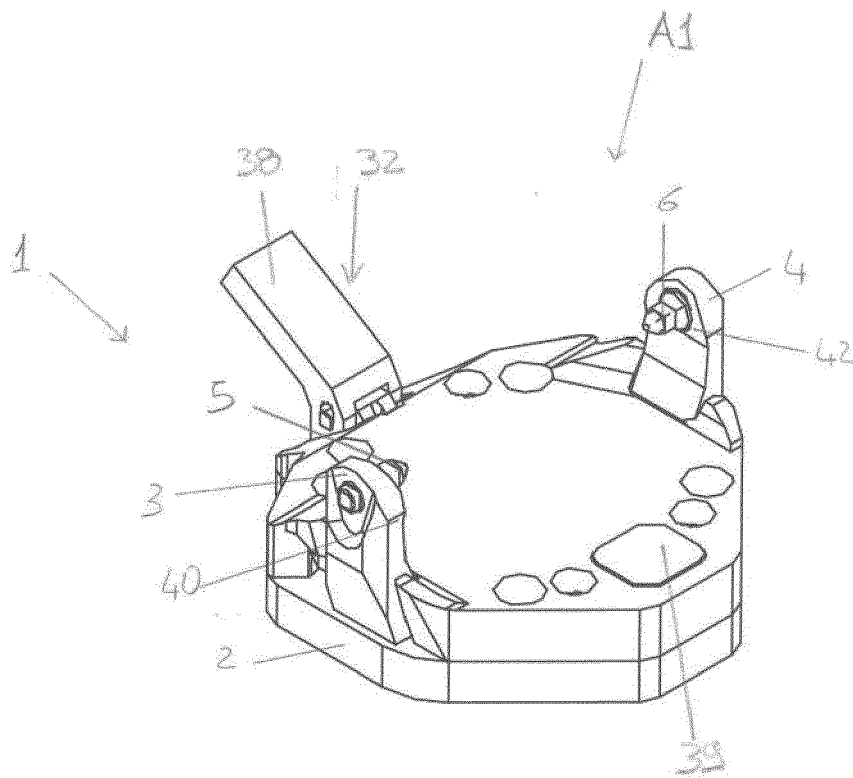


FIG. 1A

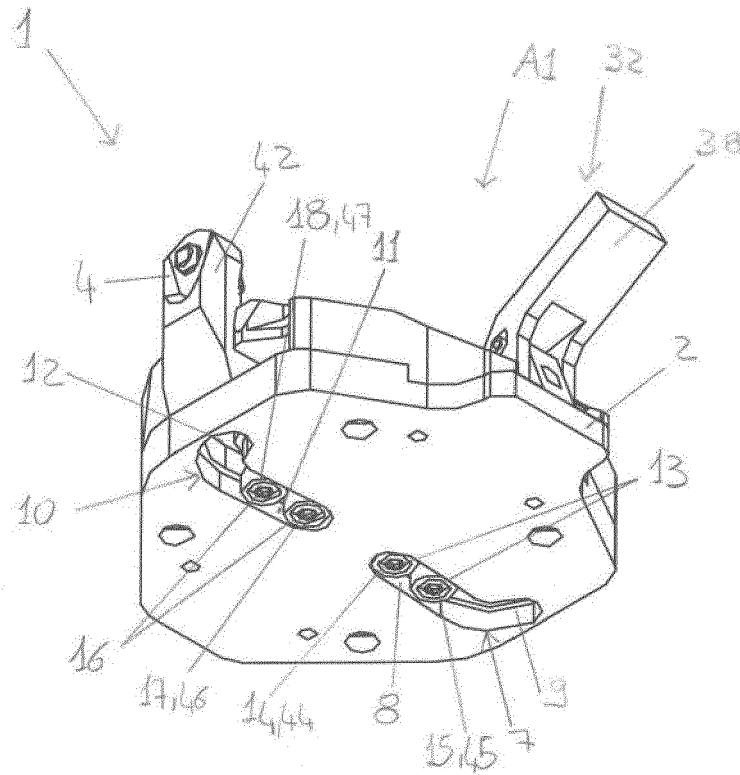
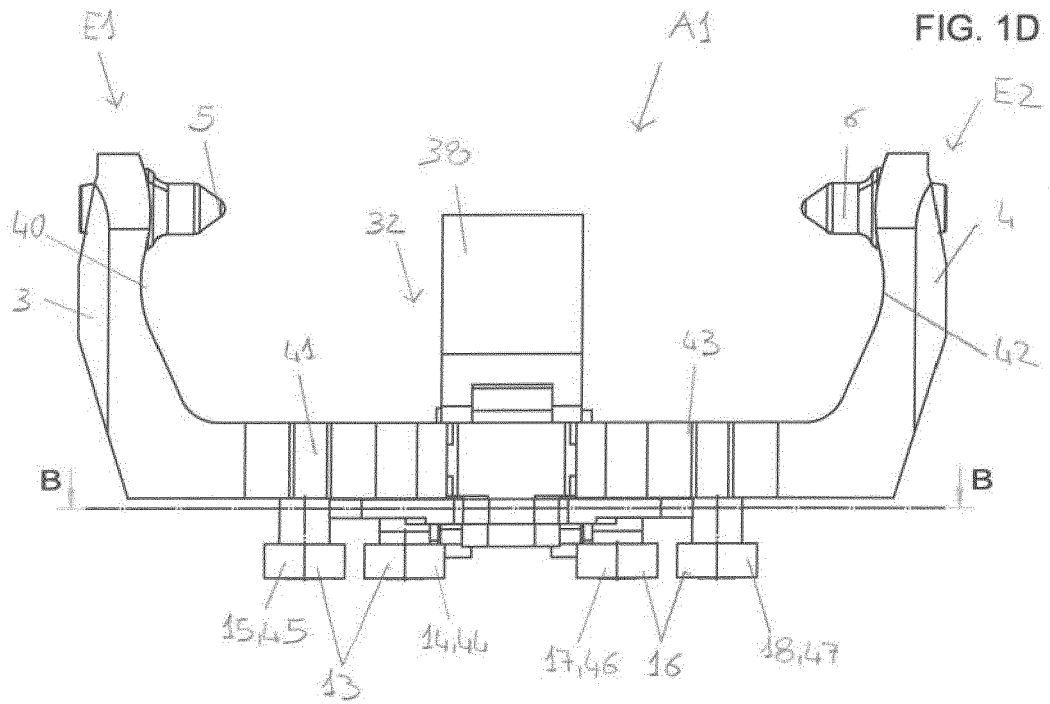
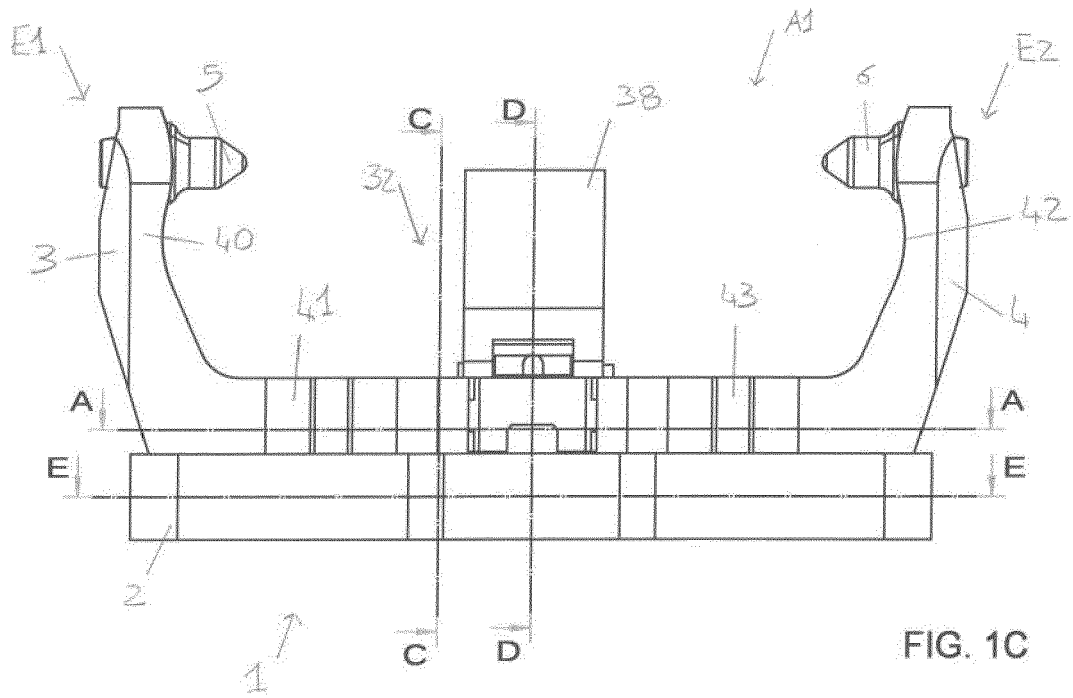


FIG. 1B



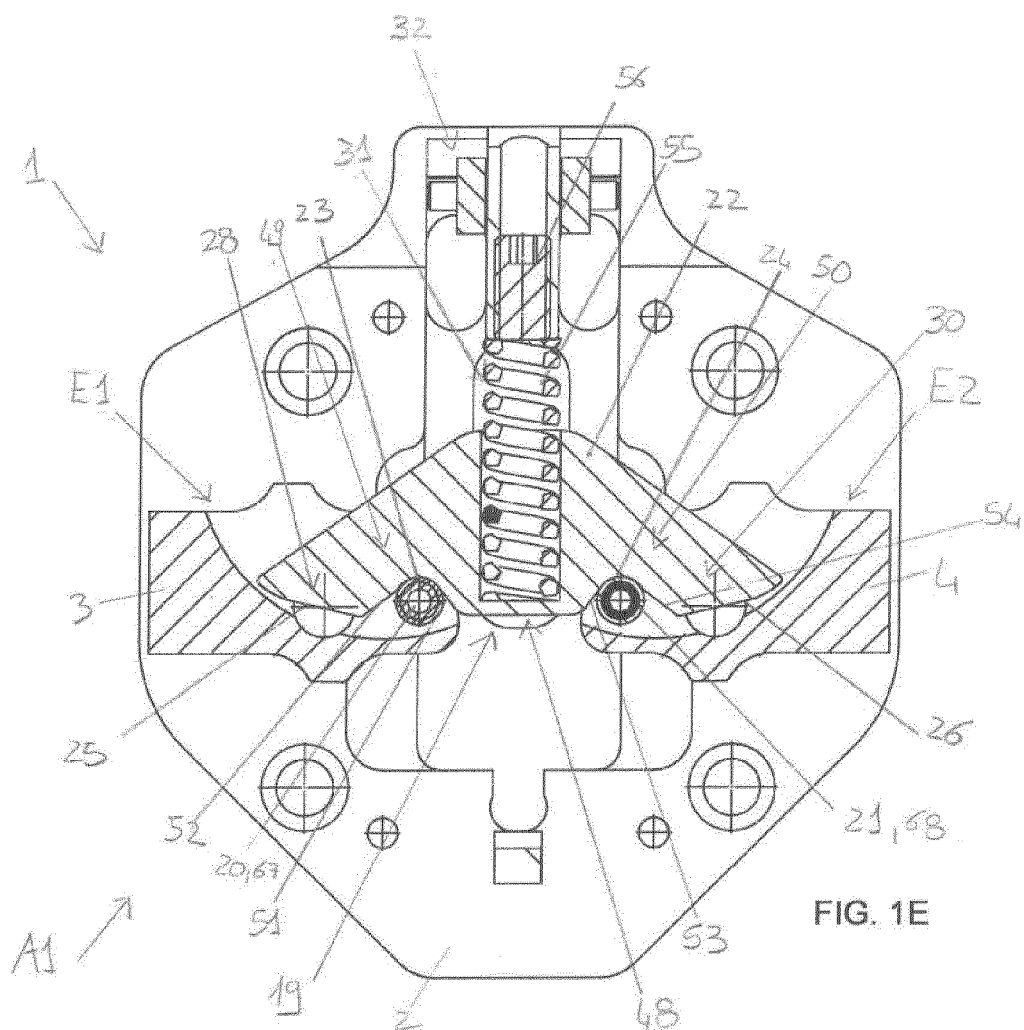


FIG. 1E

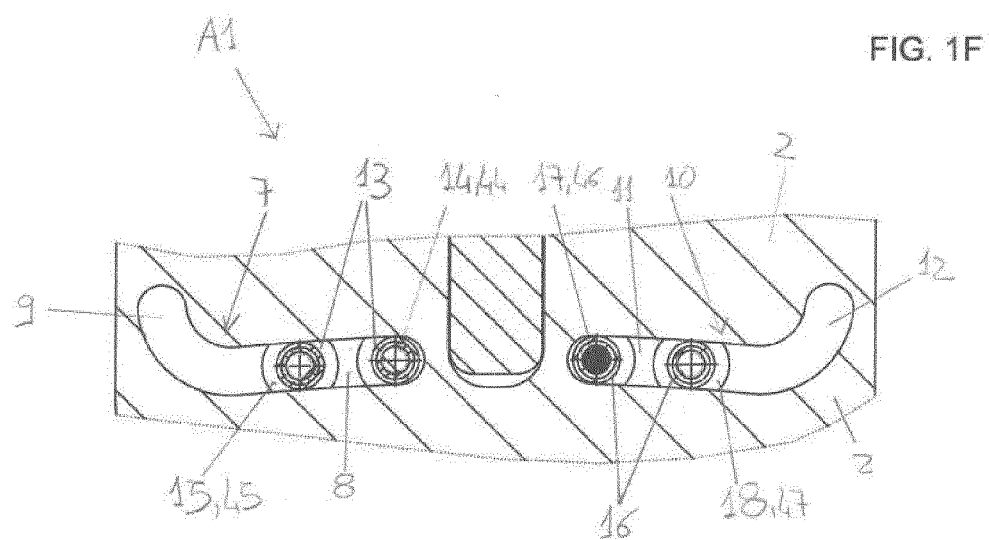
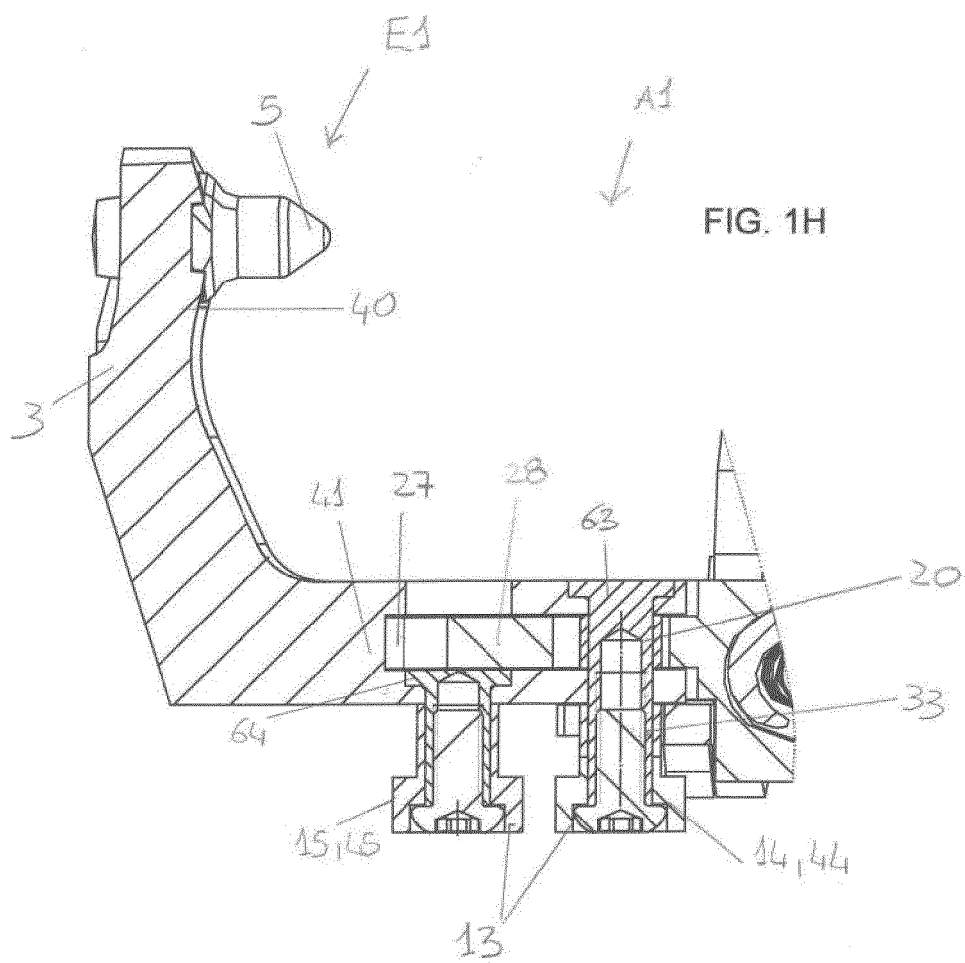
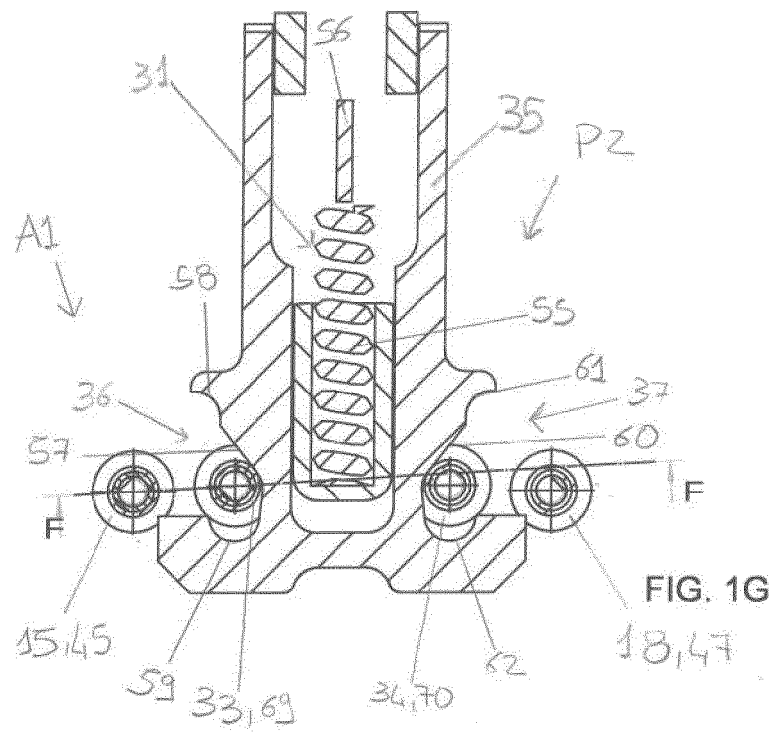


FIG. 1F



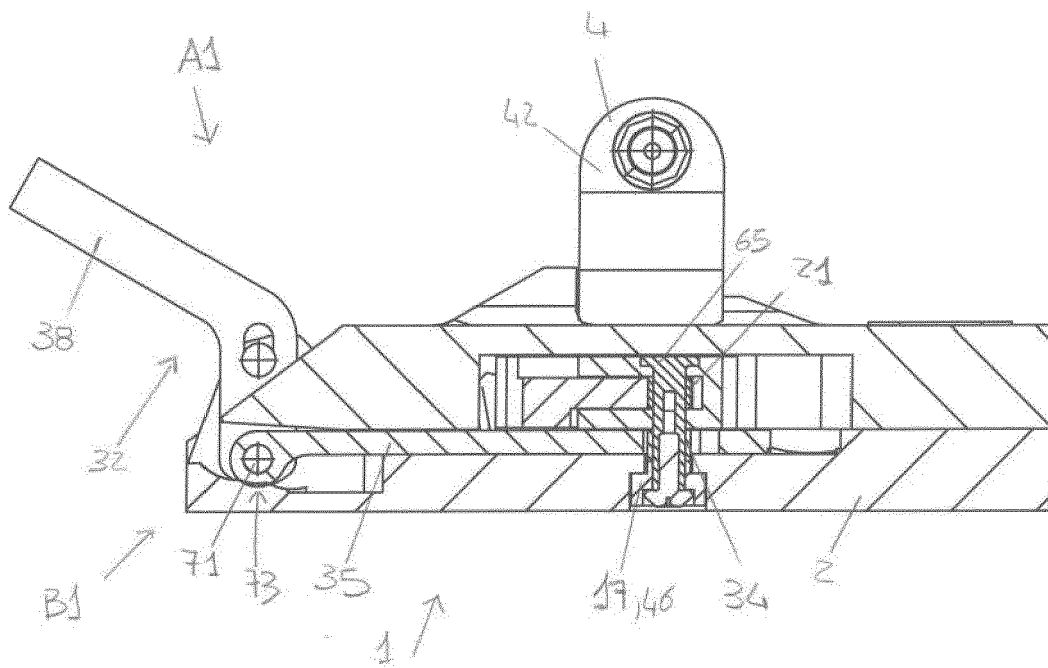


FIG. 1I

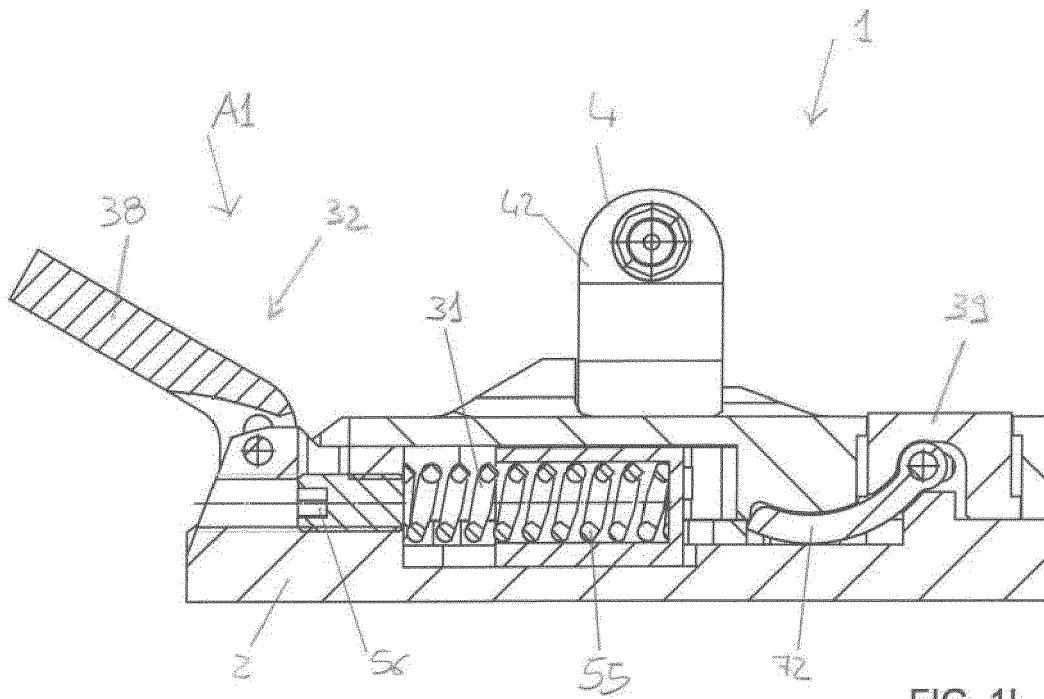


FIG. 1L

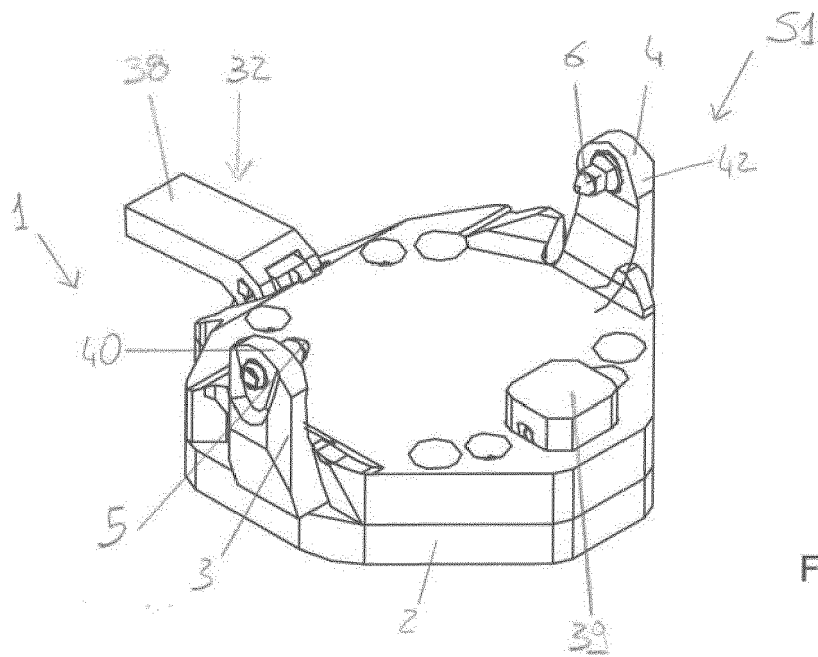


FIG. 2A

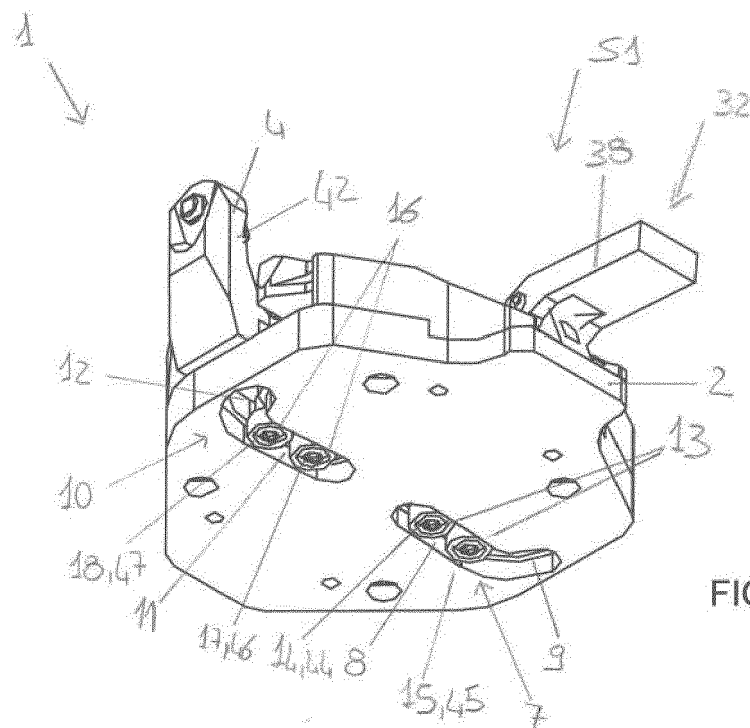
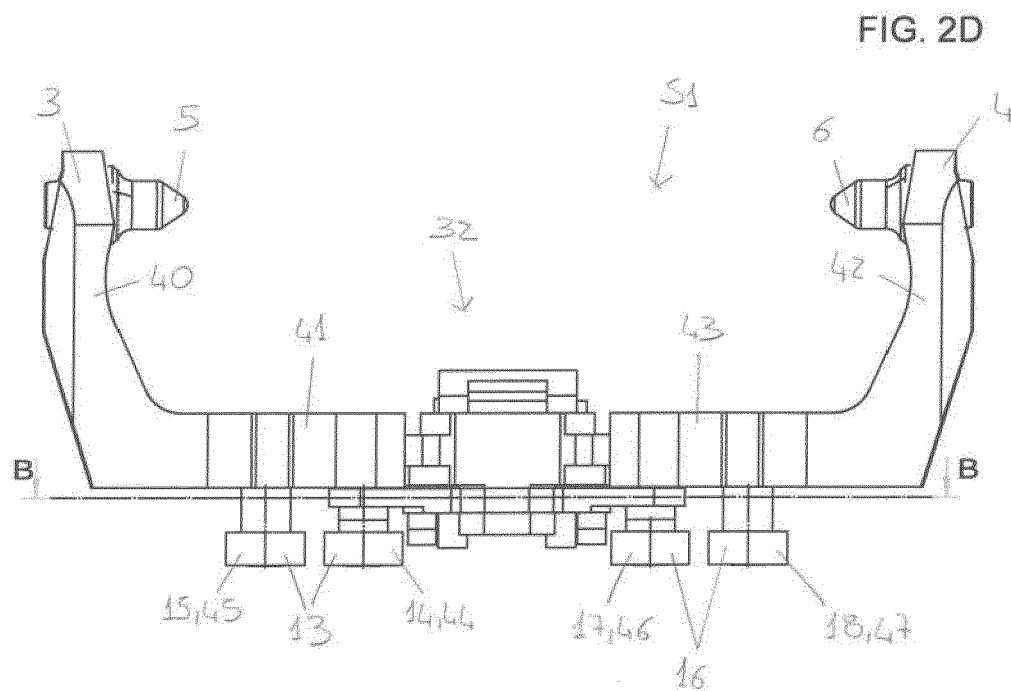
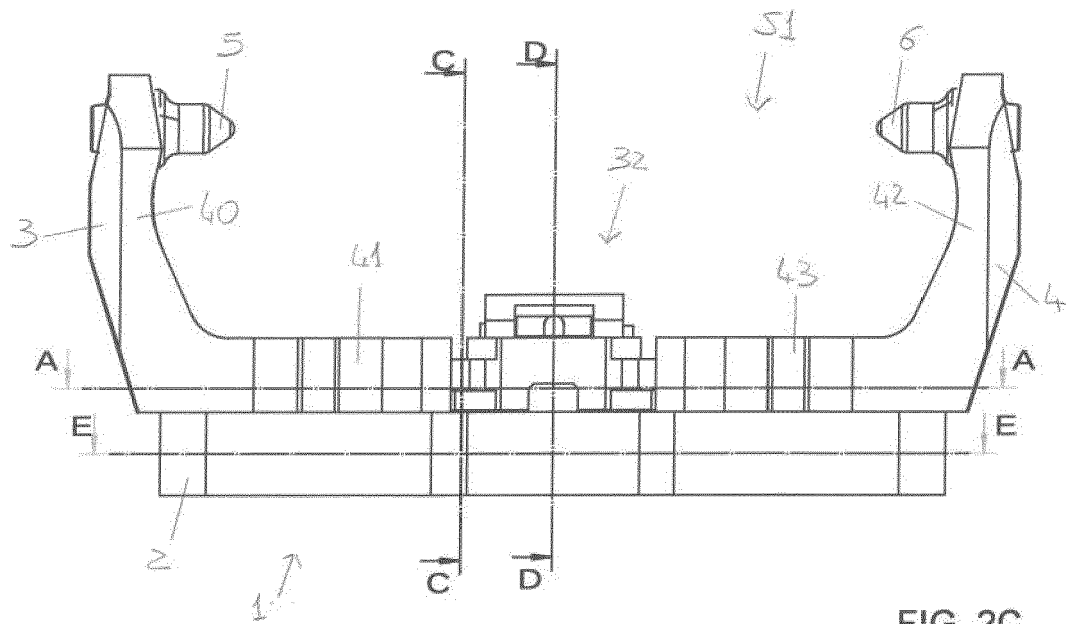
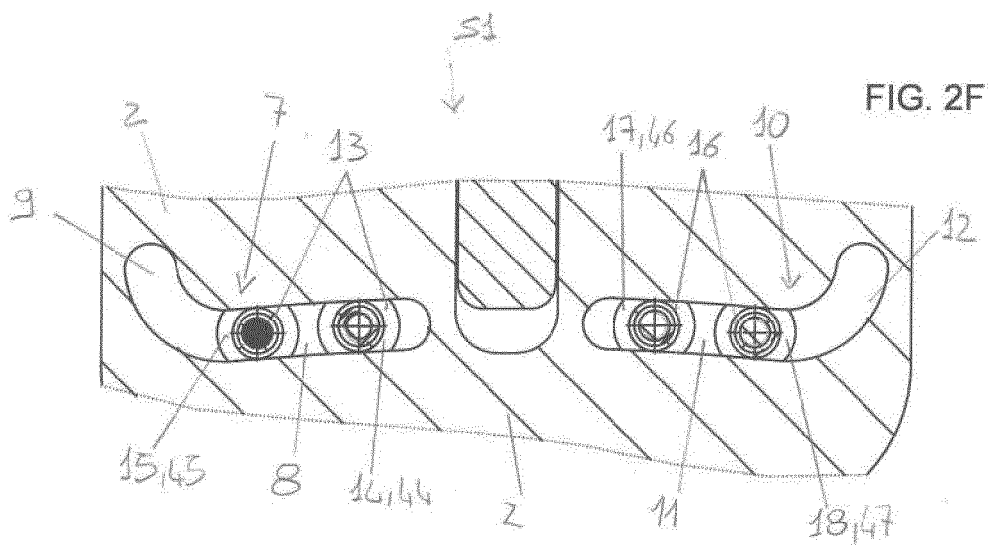
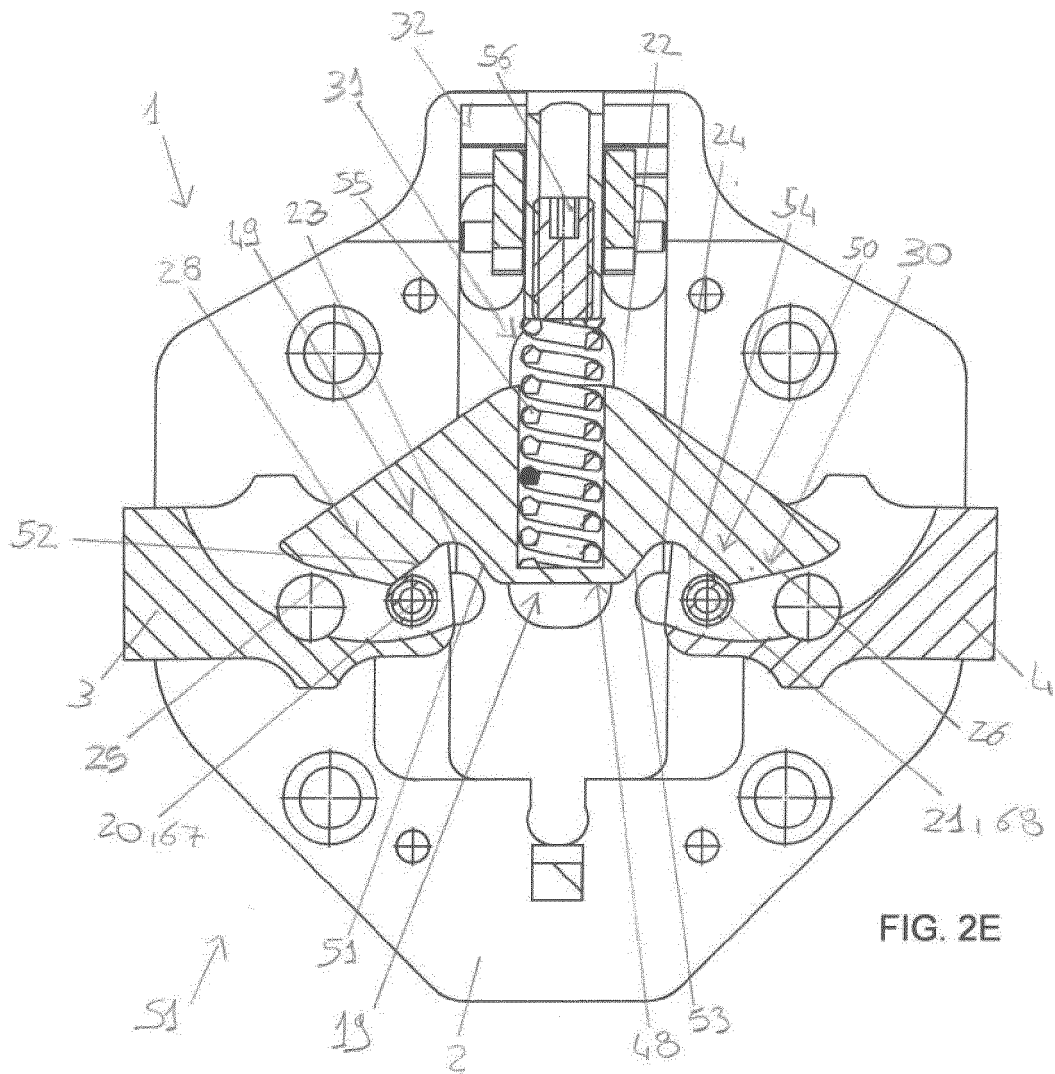
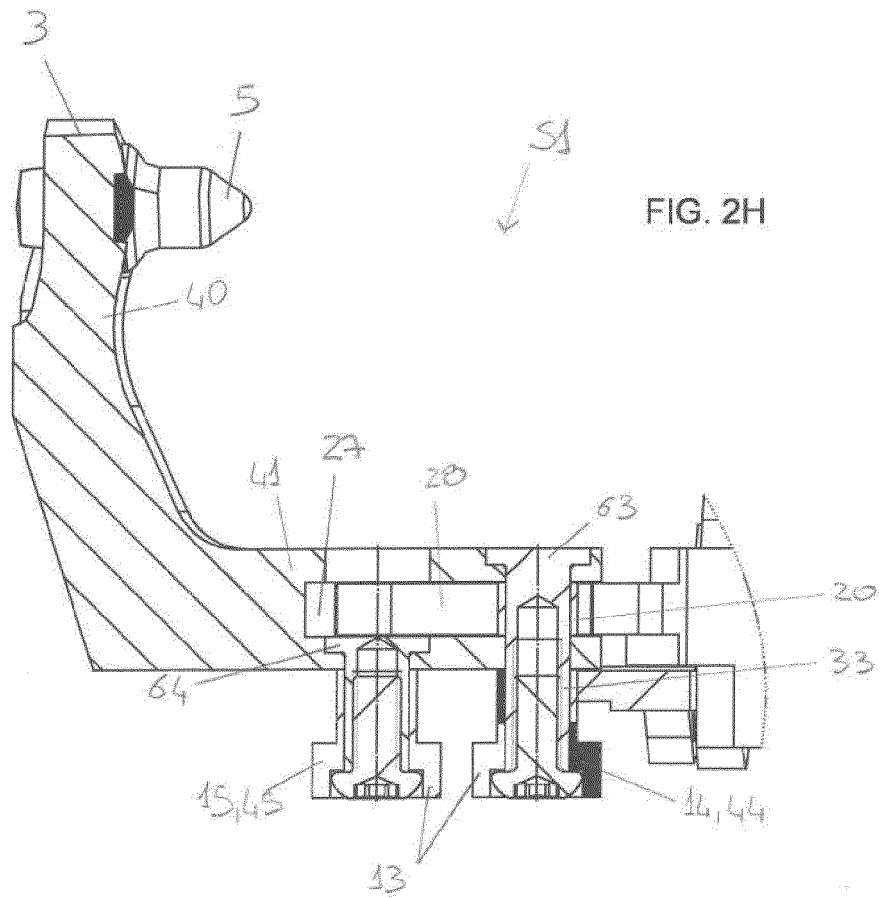
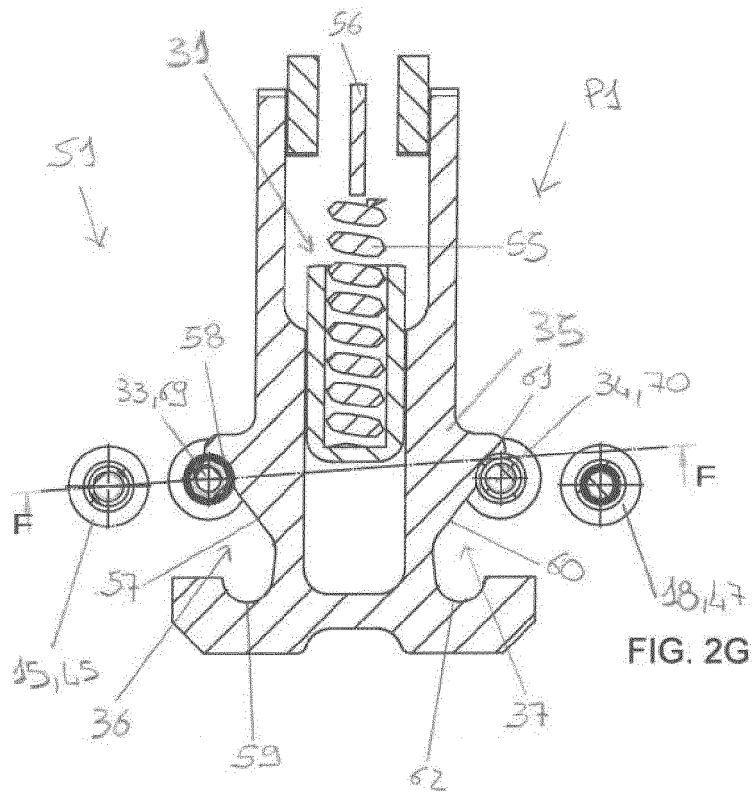


FIG. 2B







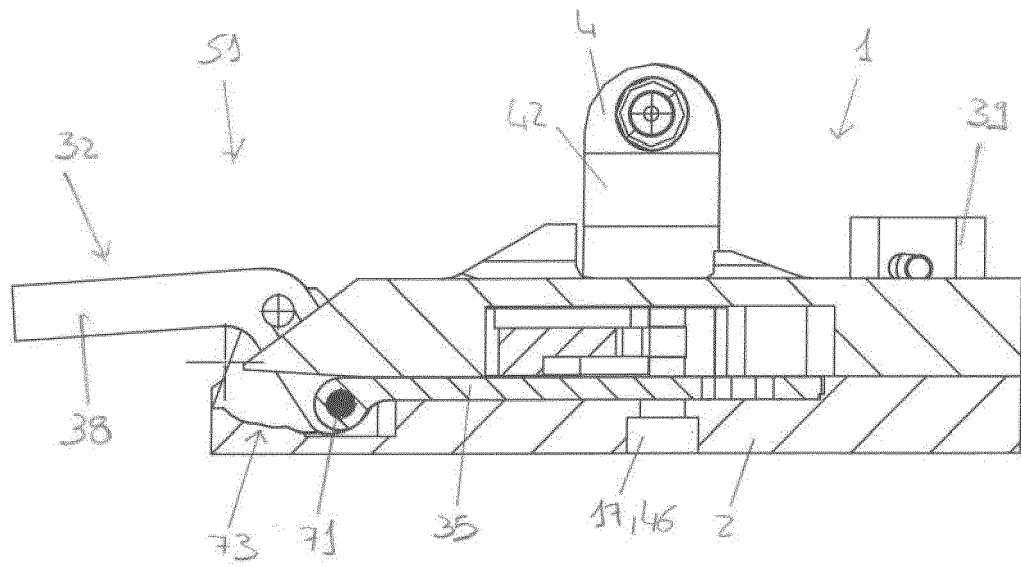


FIG. 2I

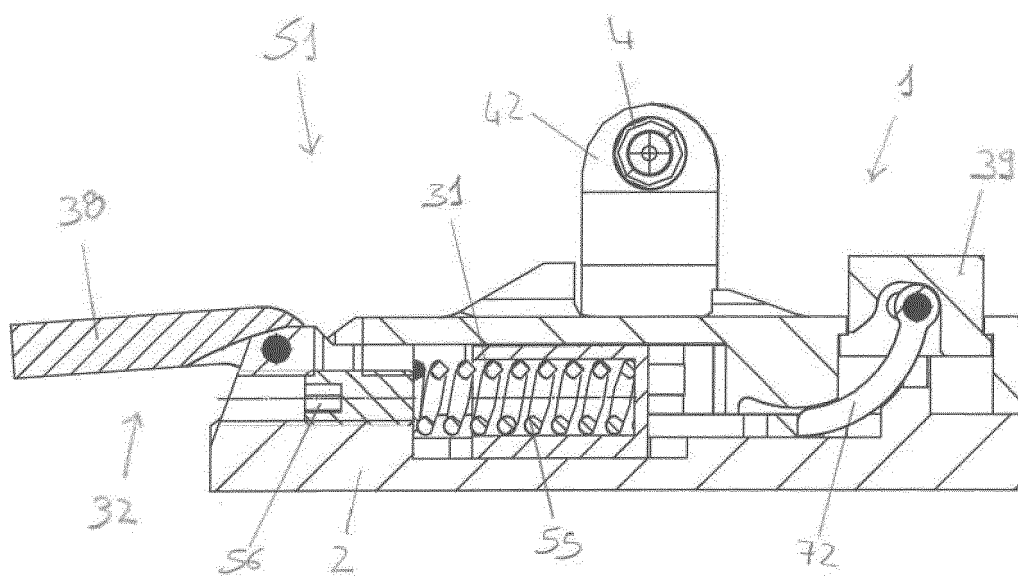


FIG. 2L

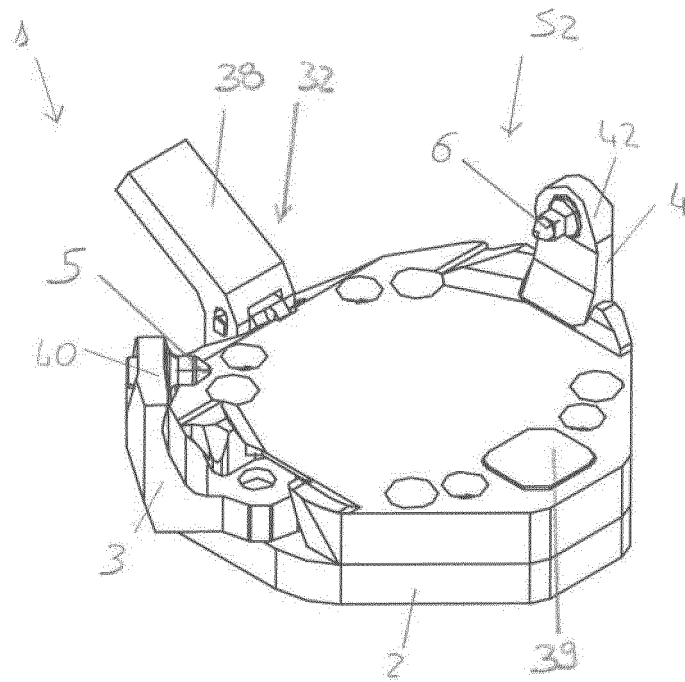


FIG. 3A

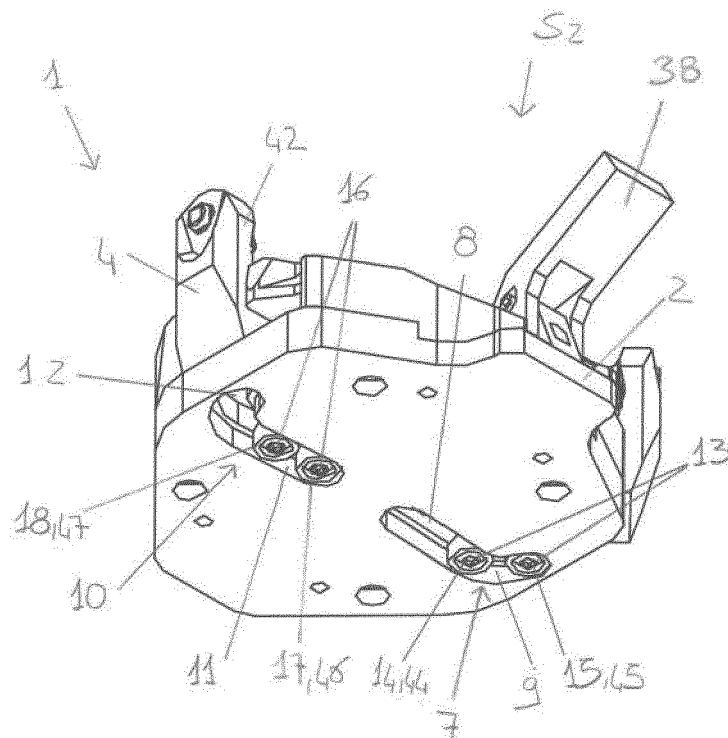
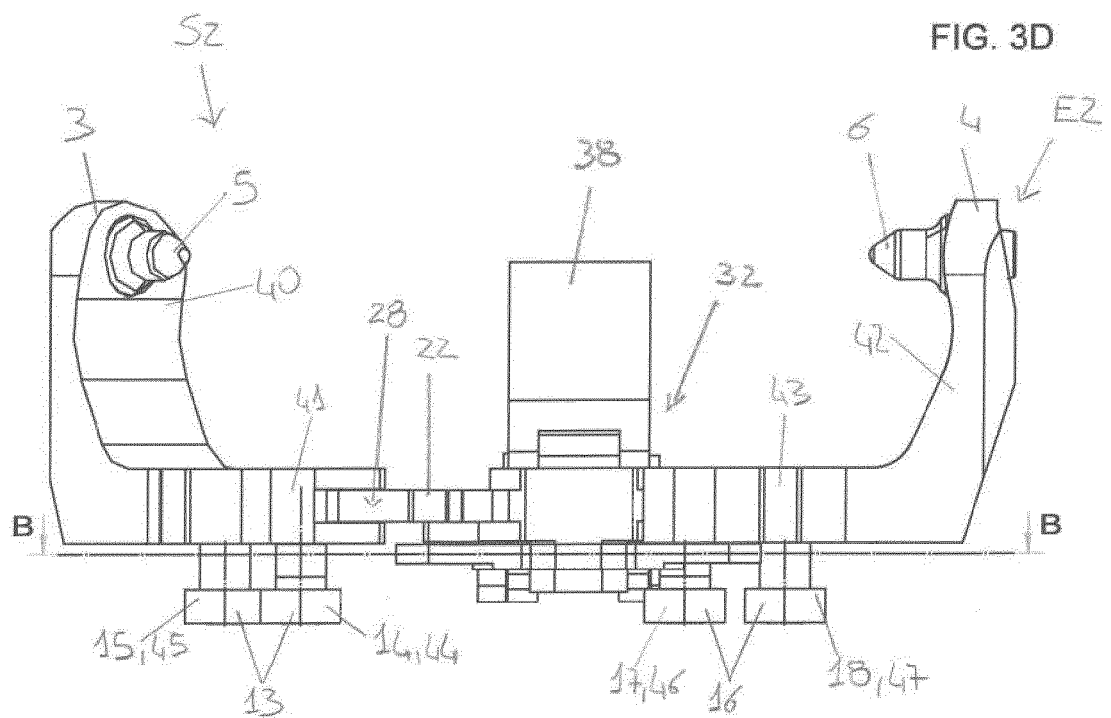
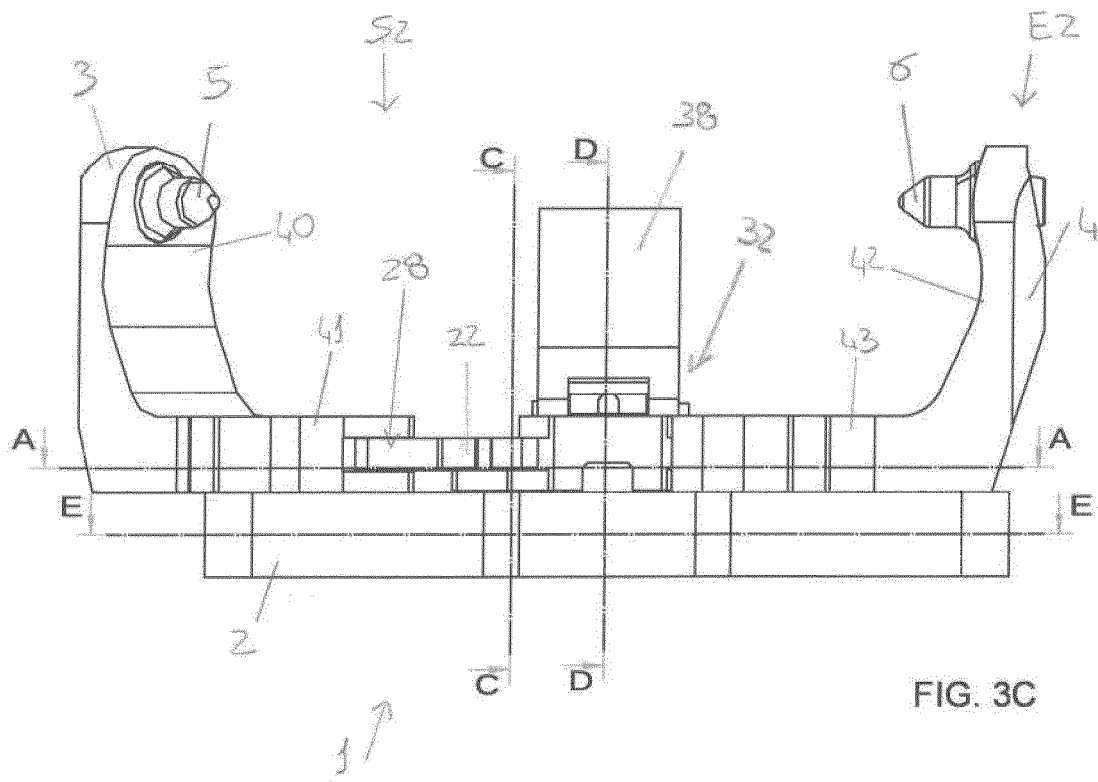


FIG. 3B



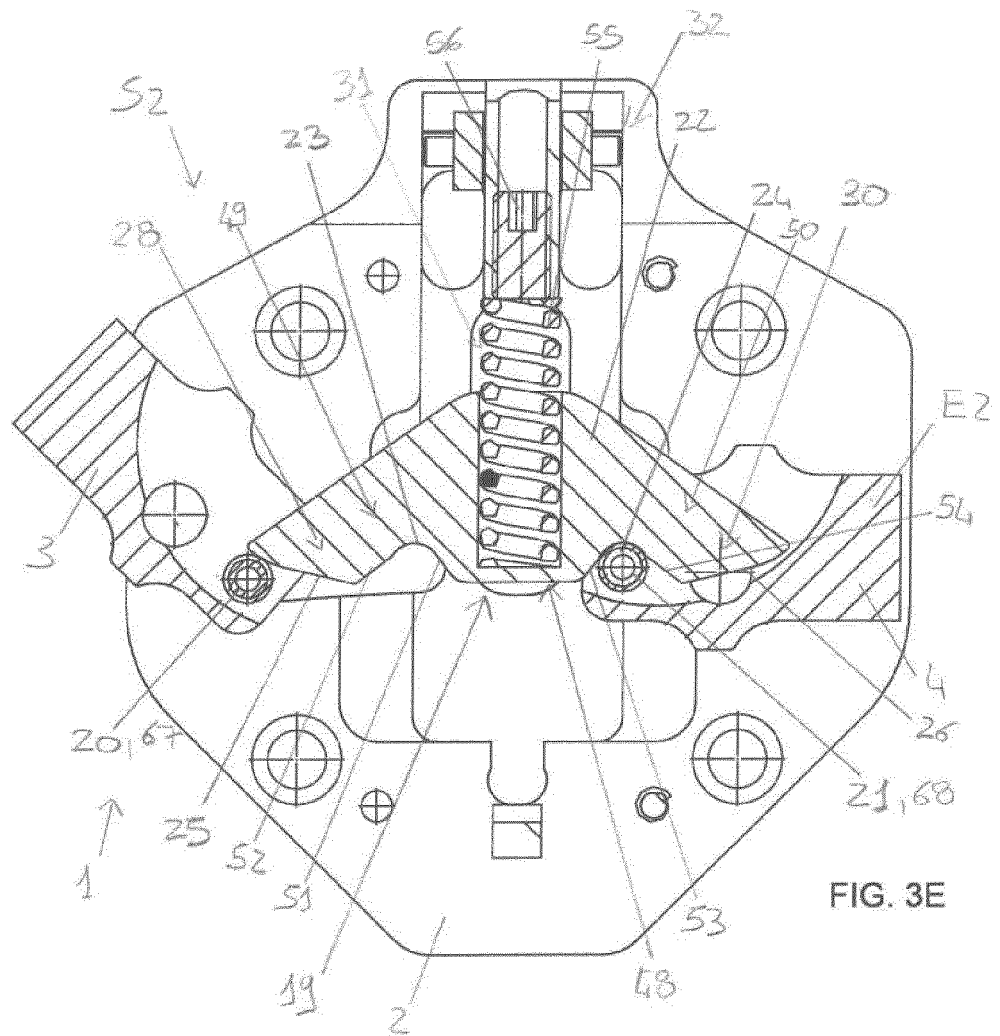


FIG. 3E

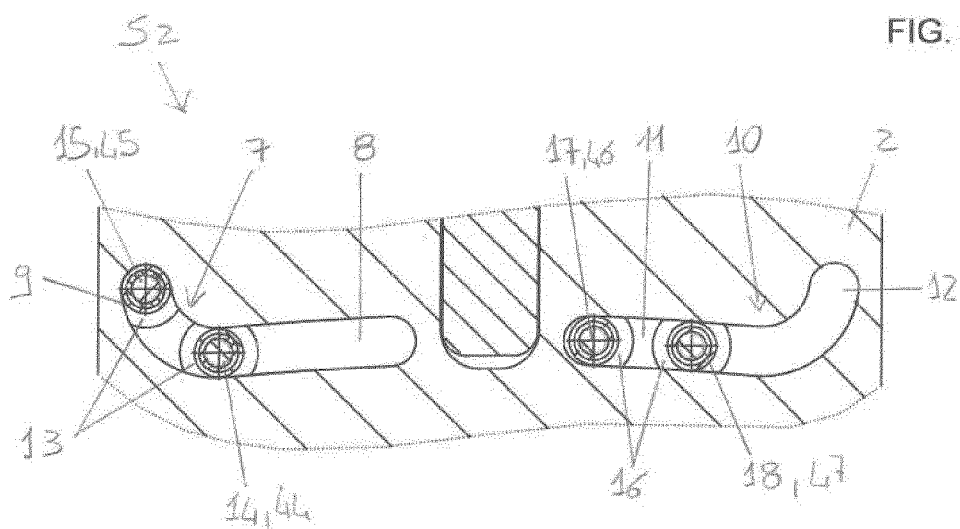
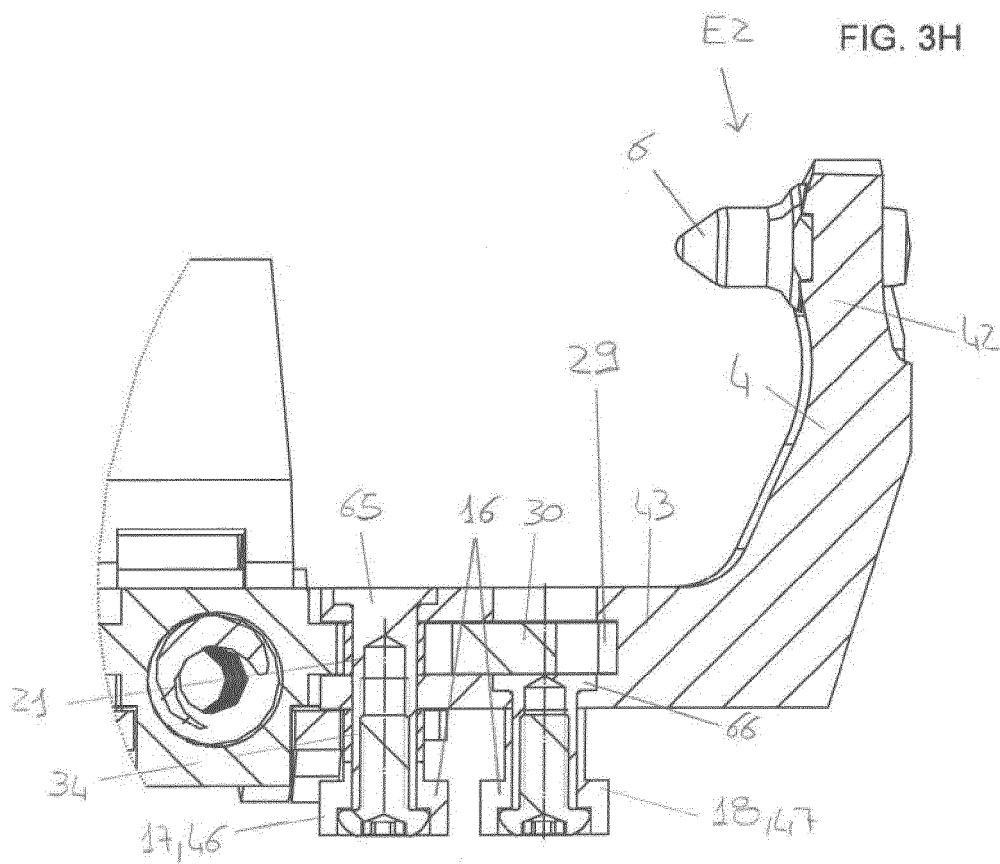
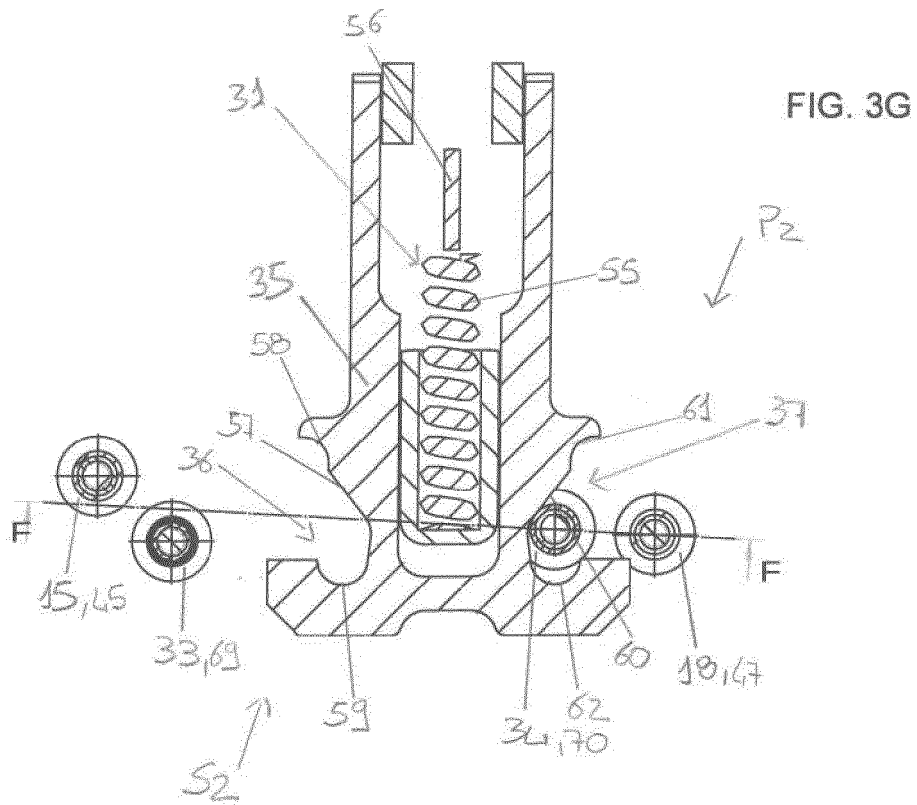


FIG. 3F



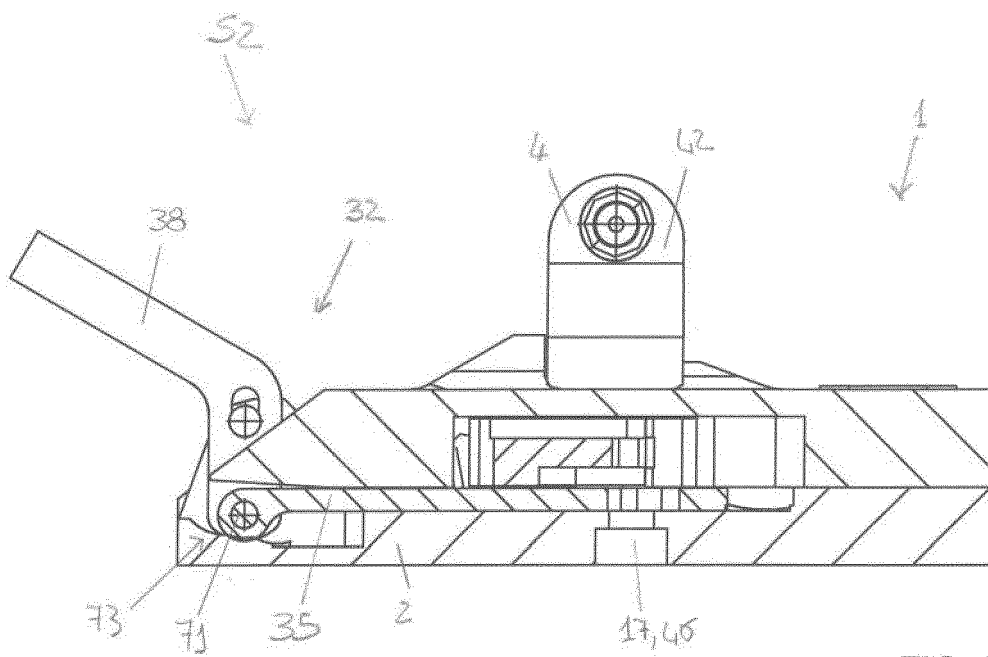


FIG. 3I

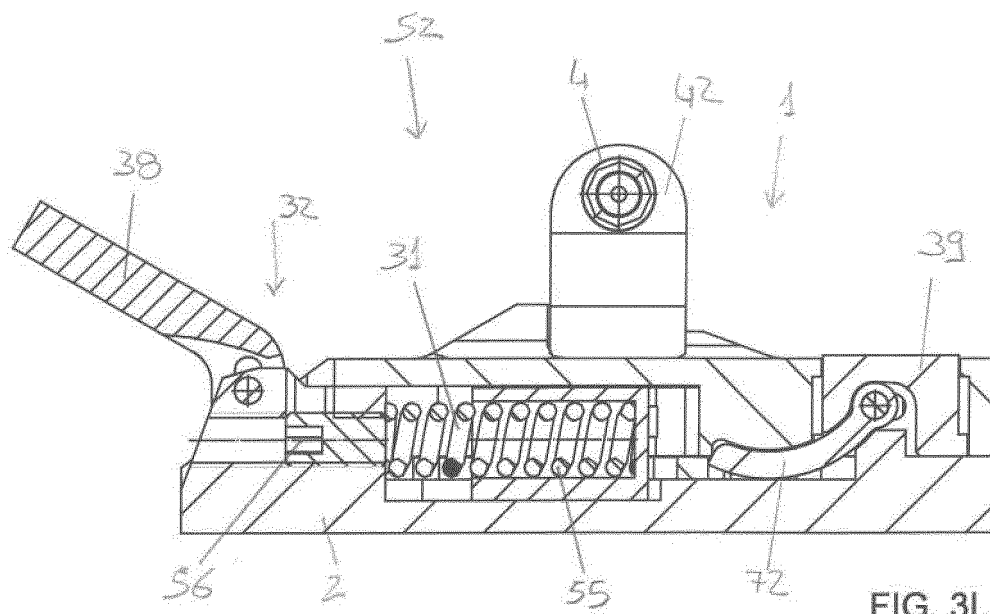


FIG. 3L

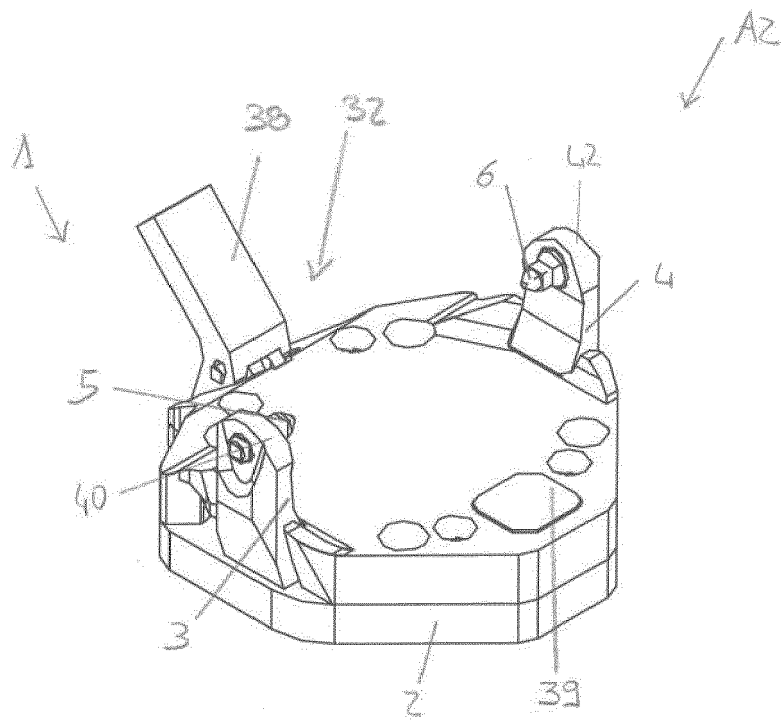


FIG. 4A

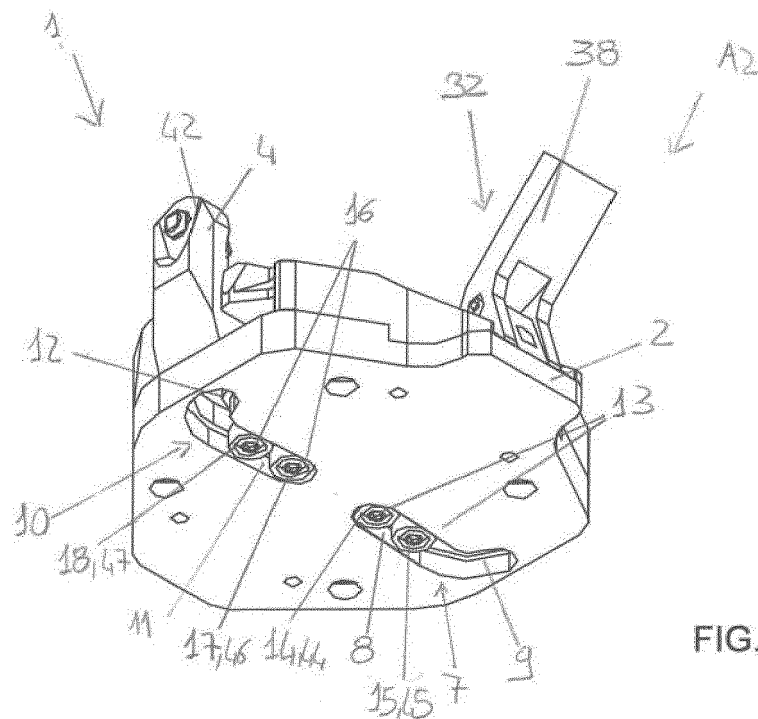
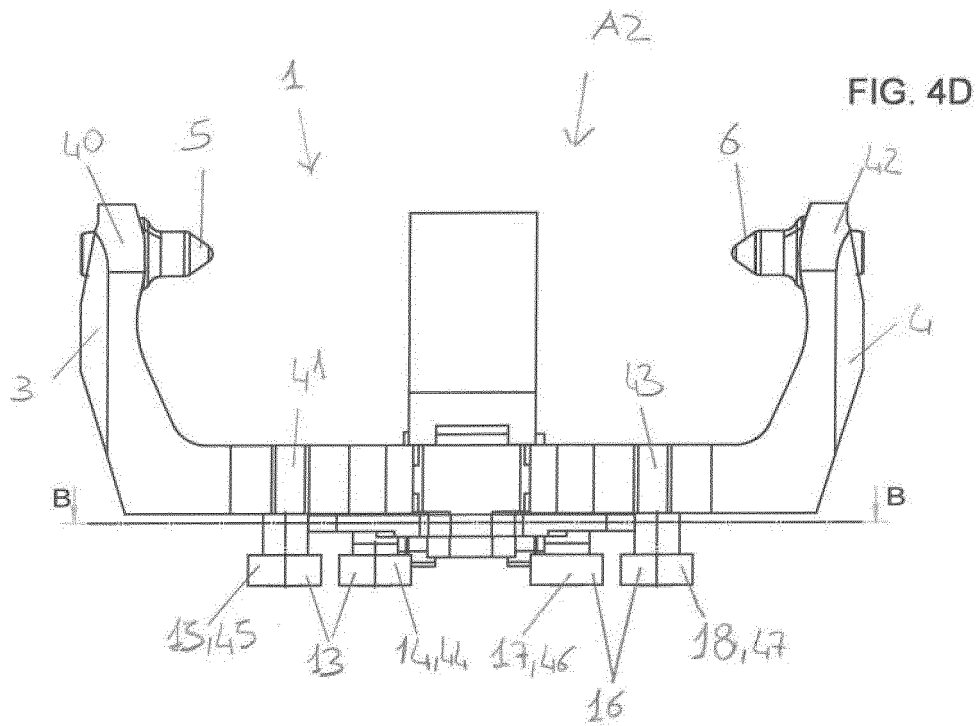
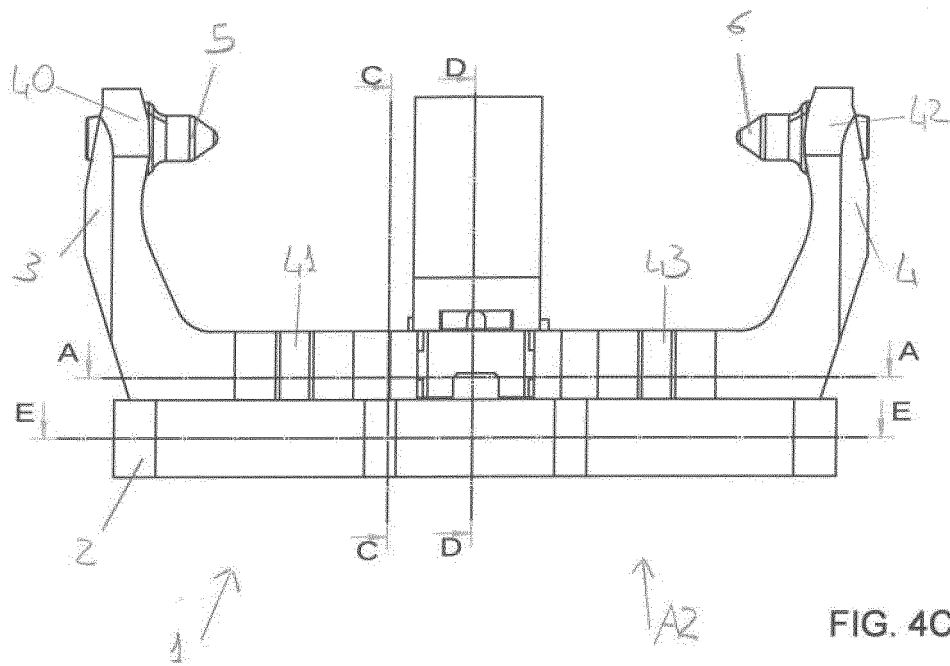


FIG. 4B



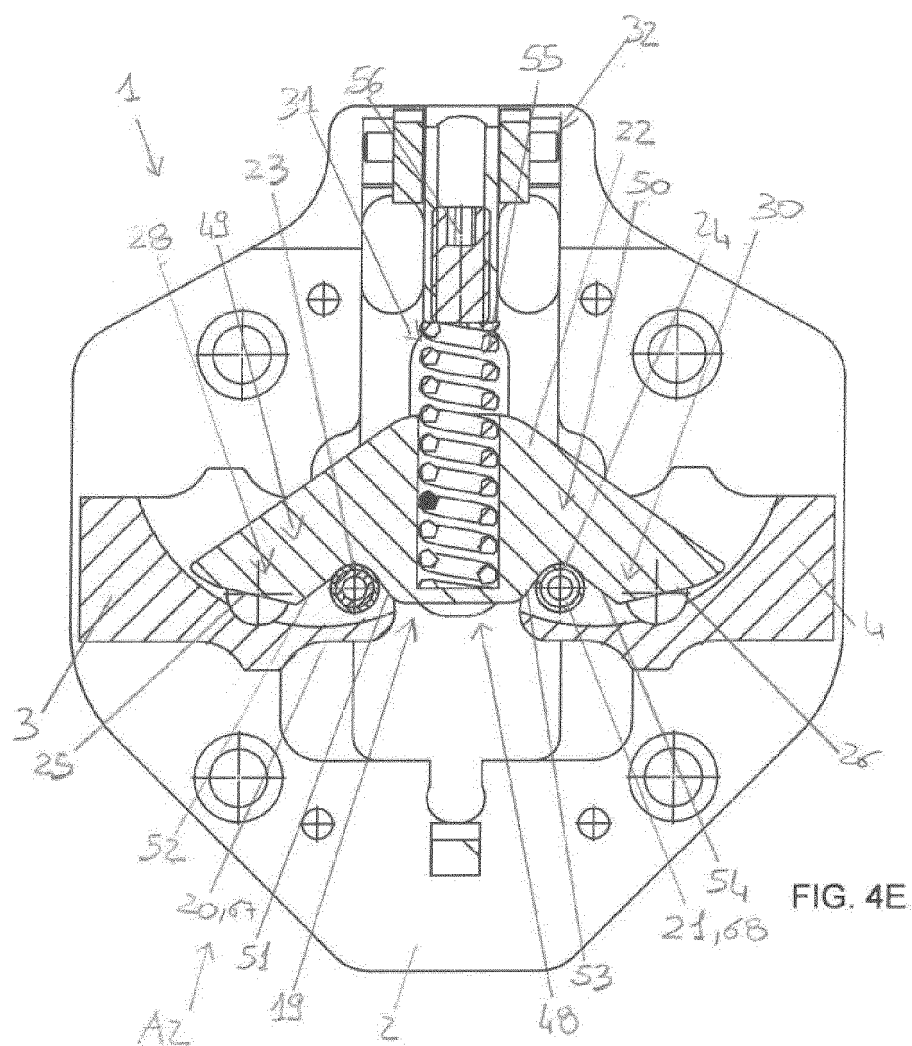


FIG. 4E

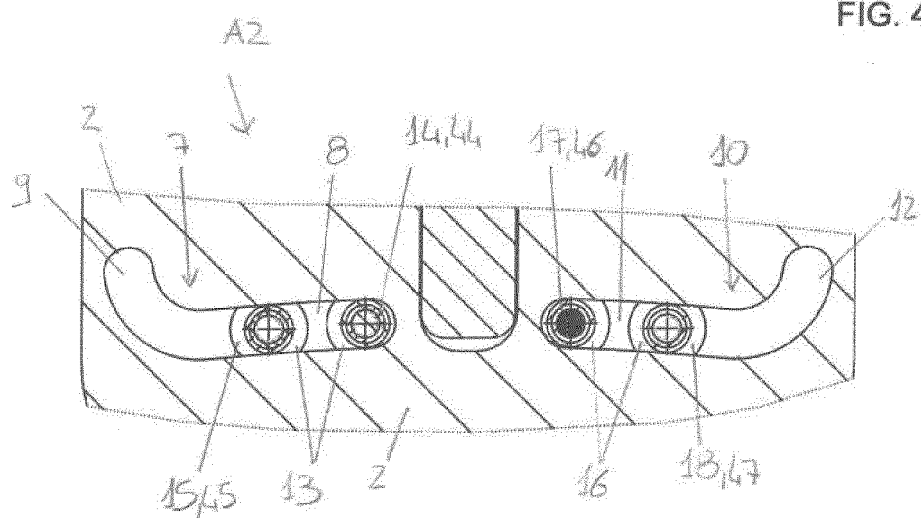
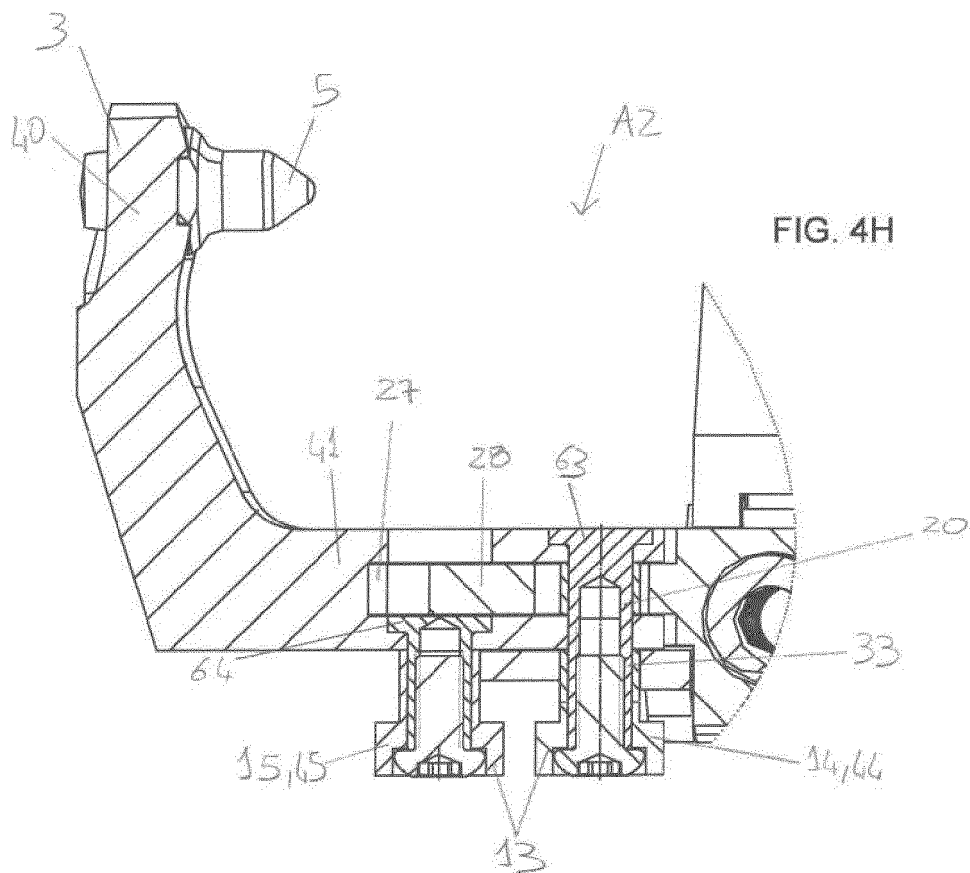
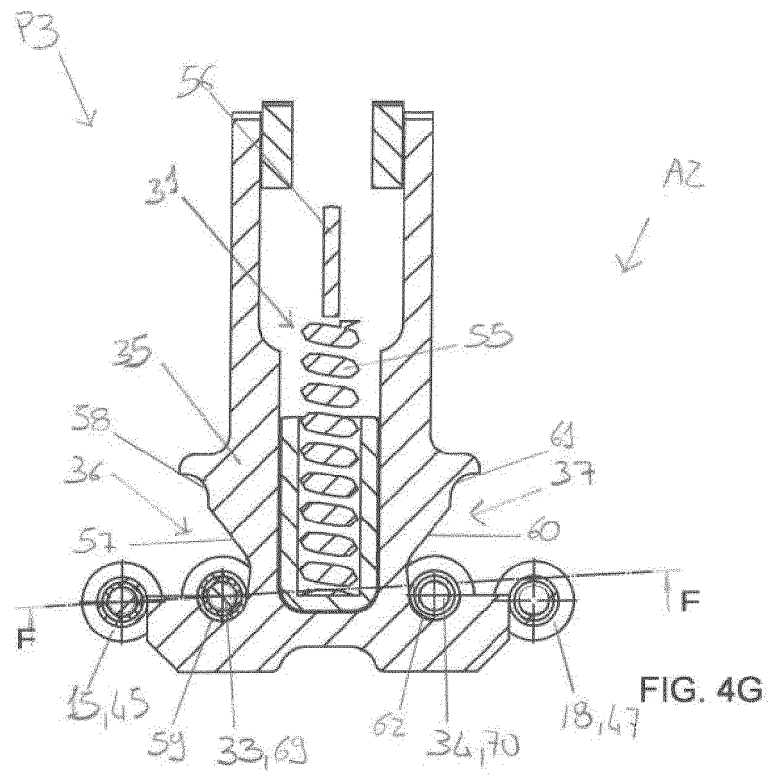
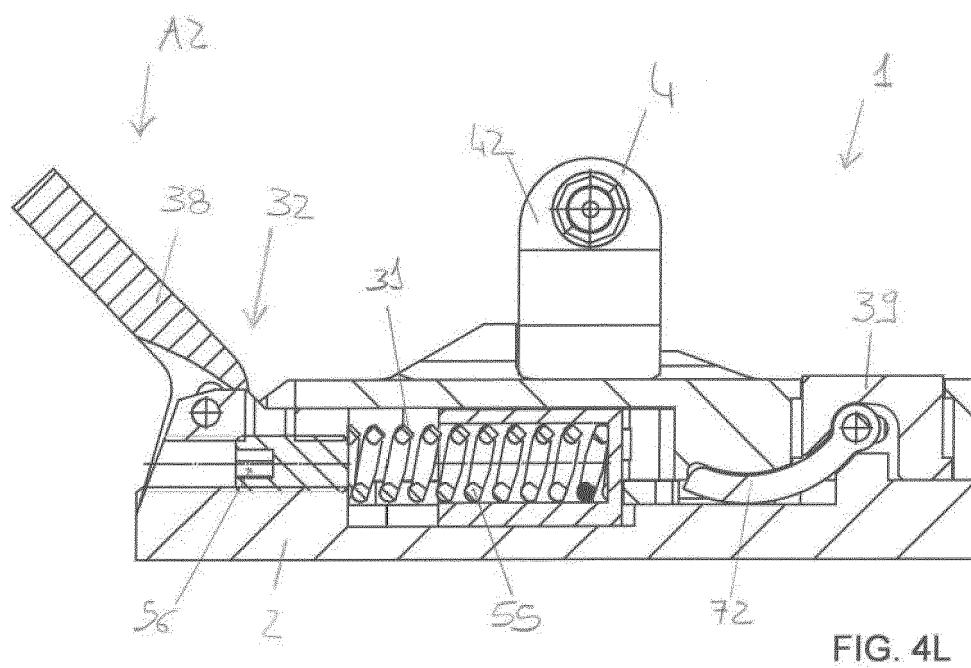
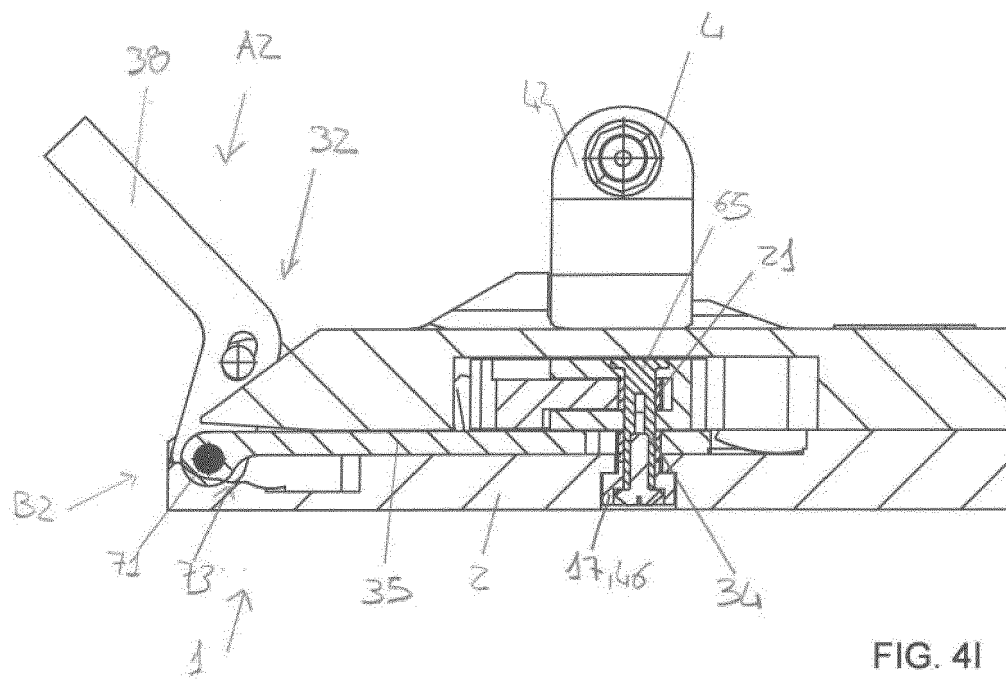


FIG. 4F







EUROPEAN SEARCH REPORT

Application Number
EP 19 20 3517

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	EP 3 184 155 A1 (SALOMON SAS [FR]) 28 June 2017 (2017-06-28) * paragraphs [0031], [0071], [0088] - [0090]; figure 3 *	1-15	
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Place of search Munich		Date of completion of the search 9 March 2020	Examiner Murer, Michael
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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