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(71) Applicant: **Rigat, Marco**
10054 Cesana Torinese (IT)

(72) Inventor: **Rigat, Marco**
10054 Cesana Torinese (IT)

(74) Representative: **Di Gennaro, Sergio**
Barzanò & Zanardo Milano S.p.A.
Corso Vittorio Emanuele II, 61
10128 Torino (IT)

(54) **Toe piece for touring binding**

(57) A front-retaining element 10 for a ski-mountaineering binding, fixed to a ski 100, comprising a first element 20 and a second element 30 for holding a tip of a ski boot, made with respective tongues 20b, 30b.

Each of said tongues 20b, 30b comprises a pin 20c, 30c able to be inserted in a recess of a tip of a ski-mountaineering boot for locking it.

Said locking is obtained through a rotation along an axis that is parallel to the vertical axis "Z", without flexing, of at least one of said elements 20, 30.

Such a front-retaining element 10 comprises at least one fastener 90 able to keep said first element 20 and said second element 30 in a resting or closed operative configuration.

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Description

[0001] The present invention concerns the field of ski bindings and in detail it refers to a front retaining element for a ski-mountaineering binding.

[0002] It is known that ski-mountaineering bindings have a front retaining element and a heel piece that are respectively designed so as to hold a ski boot in a removable manner.

[0003] In detail, it has to be possible to remove the ski boot from the binding according to the user's will.

[0004] According to the adjustment of the manufacturer, such a binding has to release the boot in the case in which there is an impact or fall, or rather when a predetermined threshold force has been exceeded, at least according to the weight of the skier himself.

[0005] For this precise reason, there are on the market ski bindings in which both the front-retaining element and the heel piece are equipped with means for adjusting a release force, for releasing the ski boot.

[0006] Conventional front-retaining elements use a pair of lateral tongues that can be opened and held facing one another in a resting or closed configuration by elastic retaining means.

[0007] On the lateral tongues there are some pins or shafts for being fixedly connected to a front part of a ski-mountaineering boot; such pins or shafts must allow the boot to rotate around them, so as to allow the skier to raise the rear part of said boot. Such a movement is necessary when the ski is used to go up a slope.

[0008] When skiing downhill, the boot must be locked also at the heel piece.

[0009] There are front-retaining elements for ski-mountaineering binding which use flexible tongues on which the pins or shafts are installed, above mentioned, which can thus be opened by forcing the insertion of the tip of the boot either directly or through a tool.

[0010] However, the precise adjustment of the force they exert on the tip of the boot is difficult, with the risk of becoming either too weak or too strong.

[0011] In the first case, the undesired unfastening of the ski boot from the front-retaining element is facilitated, in the second case, on the contrary, the boot may not be realeased from the front-retaining element even with an impact, like for example with a fall.

[0012] Moreover, through a front-retaining element equipped with flexible tongues, it is not possible to incrementally adjust the resistance thereof; at the most it is possible to reduce the resistance, by making suitable weakening cuts or holes.

[0013] Patent application US3797841 describes a device for binding a boot to a ski, equipped with a bifurcated element comprising two tongues. Such a bifurcated element makes it possible, for said tongues, to vary their distance apart for locking or unlocking the boot.

[0014] The purpose of the present invention is that of making a front-retaining element for a ski-mountaineering binding which does not have the drawbacks described above.

[0015] According to the present invention a front-retaining element is made for a ski-mountaineering binding as claimed in the first independent claim. The additional characteristics are covered in the attached dependent claims.

[0016] The characteristics and the advantages of the front-retaining element according to the present invention shall become clearer from the following description of different embodiments and from the attached drawings, which respectively show:

- figures 1A, 1B, 1C and 1D show different views of a first embodiment of the front-retaining element for a ski-mountaineering binding according to the present invention, respectively: figure 1A in a perspective view, figure 1B in a front view, figure 1C in a side view, figure 1D in a plan view from above;
- figures 2A 2B, 2C and 2D show different views of a second embodiment of the front-retaining element for a ski-mountaineering binding according to the present invention, respectively: figure 2A in a perspective view, figure 2B in a front view, figure 2C in a side view, figure 2D in a plan view from above;
- figures 3A, 3B and 3C show different views of a third embodiment of the front-retaining element for a ski-mountaineering binding according to the present invention, respectively: figure 3A in a perspective view from above, figure 3B in a perspective view from below, figure 3C in a plan view from above;
- figures 4A, 4B and 4C show different views of a fourth embodiment of the front-retaining element for a ski-mountaineering binding according to the present invention, respectively: figure 4A in a perspective view from above, figure 4B in a perspective view from below, figure 4C in a plan view from above;
- figures 5A and 5B show different views of a fifth embodiment of the front-retaining element for a ski-mountaineering binding according to the present invention, respectively: figure 5A in a perspective view from above, figure 5B shows the support bar in a perspective view from below;
- figures 6A, 6B, 6C, 6D and 6E show different embodiments of the fastener for the front-retaining elements according to the present invention, in particular: figure 6A shows a first embodiment of the fastener applied to a front-retaining element according to the present invention, figure 6B shows a second embodiment of the fastener applied to a front-retaining element according to the present invention, figures 6C, 6D and 6E show different alternative embodiments of the first embodiment of figure 6A;

- figures 7A, 7B, 7C and 7D, show different embodiments of the elastic element applied to the front-retaining element, according to the present invention, shown in the third, fourth and fifth embodiment;

- figures 8A, 8B, 8C and 8D show different details of the front-retaining elements according to the present invention, in particular: figure 8A shows a front view of the first element of the fifth embodiment of figures 5A, 5B; figure 8B shows a perspective view of the first element of the fifth embodiment of figures 5A and 5B; figure 8C shows a perspective view of the first element of the front-retaining element according to the present invention; figure 8D shows a perspective view from below of a portion of the front-retaining element according to the present invention.

[0017] With reference to the aforementioned figures front-retaining element 10, according to the present invention, comprises a first element 20, and a second element 30 for holding a tip of a ski boot, made with respective tongues 20b, 30b, arranged orthogonal with respect to the plane on which ski 100 lies, for example parallel to a vertical axis "Z", on an upper surface thereof and being pinned to it through screws or rivets, which are not shown, which are inserted in holes 101 present or made on ski 100.

[0018] Each of the tongues 20b, 30b, comprises a pin 20c, 30c adapted to be inserted in a recess of a tip of a ski-mountaineering boot, for locking it, at the same time making it possible to rotate climbing up a slope and/or during ski-mountaineering.

[0019] Tongues (20b, 30b) are, in a first resting or closed configuration, parallel to one another and said pins substantially face one another.

[0020] Said tongues (20b, 30b) are made from a material the mechanical properties of which together with the conformation of the tongues themselves, prevent them from flexing with respect to the remaining part of the respective element 20, 30.

[0021] Said locking of the boot inside binding 10 is obtained through a rotation along an axis that is parallel to vertical axis Z, without flexing, of at least one of said elements 20, 30. Indeed, at least one of said elements 20 and 30 rotates, along an axis that is parallel to a vertical axis Z, without flexing, through a pivot point 24, positioned on a support bar 50 which, in use, is fixedly connected to ski 100 through a plurality of through holes 51, so as to house the tip of the ski-mountaineering boot.

[0022] In an open configuration, through which the tip of the boot enter between the tongues and therefore between the pins 20c, 30c, the tongues 20b, 30b are oriented on planes that are not parallel.

[0023] Preferably, each of said pivot points 40 comprises at least one bearing, for example a ball bearing, adapted for reducing the friction during rotation of said at least one element (20, 30)

[0024] The first and second element 20, 30 are adapted to be kept in a resting or closed configuration by at least one fastener 90, preferably having an arch-shaped or sinuous central portion that is capable of conferring elasticity to the traction of fastener 90 itself in a direction that is oriented on the joint between its two ends.

[0025] As shown in figures 6A-6B, fastener 90 is positioned crosswise with respect to a direction of maximum extension of said ski 100, between the first and second element 20, 30, being inserted at a first 91 and a second end, comprising a recessed locking space 92, in a pair of holes 14 respectively positioned on tongues 20b, 30b.

[0026] In the first embodiment shown in figures 1A, 1B, 1C and 1D the second element 30 is hinged on a pivot point 40 positioned between a first front end 30a and a second rear end 30d, with respect to the tip of ski 100, so that in use the first and the second element 20,30, once they are housing the tip of the boot, are positioned intersecting, so as to form a cross, with the respective second rear ends 20d, 30d that are oriented on one side of the ski that is opposite with respect to that towards which the first front ends 20a, 30a are oriented. At said second rear end 20d, 30d, the first and the second element can be stopped by a locking means 11. In particular locking means 11 represented in figure 1A and 1D is made through a small safety rod that is equipped with a pair of holes 12 and adapted to be hinged in the second rear end 20d of the first element 20 through a rivet 13. Since the first element 20 is fixedly connected at its first end to ski 100 and since, moreover, the second element 30 is adapted to rotate with respect to ski 100, the first element 20 and the second element 30 can house the tip of the ski-mountaineering boot through a rotation also of the respective tongue 20b, 30b which being fixedly attached to the body of element 20, 30, rotates with it. Preferably, the arrangement of the first and second element 20, 30, in the resting or closed configuration, creates a symmetrical front-retaining element with respect to the longitudinal axis of ski 100, where it is positioned, parallel to an axis "X", perpendicular to said vertical axis "Z".

[0027] When the tip of the boot is introduced between the tongues (20b, 30b), these are closed up with respect to one another, acting, for example, on the second end 20d, 30d, and are brought back into the resting or closed configuration in which they fixedly connect the tip of the boot.

[0028] Such a front-retaining element 10, is associated with a fastener 90, that is not shown, adapted for locking the front-retaining element itself in the resting or closed configuration.

[0029] The locking of the first element 20 and of the second element 30 is helped by the positioning of locking means 11. Indeed, in the resting or closed configuration, the second end 30d of the second element 30 substantially places itself over an end of locking means 11, and in particular over one of its two holes 12.

[0030] In figure 1A and in figure 1D it is moreover possible to see support bar 50 of front-retaining element 10

object of the present invention; such a support bar 50 can be used to separate the first element 20 from the body of ski 100. Support bar 50 in detail comprises a hole adapted for housing the screw or rivet that passes in the hole.

[0031] Figures 2A-2D show a second embodiment of front-retaining element 10 object of the present invention. Front-retaining element 10, in these embodiments, comprises a first and a second element 20, 30 for holding a tip of a ski boot made with respective tongues (20b, 30b) which, like in the case of the first embodiment, are positioned perpendicular with respect to the plane on which ski 100 lies, parallel to a vertical axis Z.

[0032] Also in this case, only one of the two elements, first 20 and second 30, is fixed; in detail the first element 20 rotates on a pivot point 40, whereas the second element 30 is fixed to a support bar 50, which, in use, is fixedly connected to ski 100 through a plurality of through holes 51. Such a support bar 50 comprises elastic means, for example a spring, so as to limit the rotation capability of said first element 20 by exerting a force that is proportionally greater as the rotation of the first element 20 increases.

[0033] The first element 20 comprises, moreover, an elongated appendage 20g, which when the first and the second element (20, 30) are in the resting or closed configuration, is arranged parallel with respect to support bar 50. Preferably, such a support bar 50 also comprises a groove 50a adapted for engaging with the boot when the latter is correctly positioned in the present front-retaining element 10.

[0034] Substantially, the first embodiment and the second embodiment of front-retaining element 10 object of the present invention have in common the fact that they foresee at least one element having a single rotation axis Z that is vertical with respect to ski 100.

[0035] In the third embodiment of figures 3A-3C both elements 20, 30 rotate, having a rotation axis that is parallel to the vertical axis "Z", with respect to ski 100. Said first element 20 and said second element 30 are capable of rotating, in the opposite direction with respect to the opposite element in order to house the tip of a ski-mountaineering boot.

[0036] Preferably, the arrangement of the first and second element 20, 30, creates a front-retaining element that is symmetrical with respect to the longitudinal axis of ski 100.

[0037] Both elements 20, 30 comprise, moreover, an elongated appendage 20g, 30g, which when the first and second element 20, 30 are in the closed position, is arranged parallel with respect to support bar 50.

[0038] At the ends of such elongated appendages 20g and 30g at least one elastic element 6 is interposed, said element being compressed or elongated during the rotation of elements 20 and 30.

[0039] Also in the fourth embodiment of figures 4A-4C both elements 20, 30 rotate, having a rotation axis that is parallel to vertical axis Z, with respect to ski 100, and being able to rotate, in opposite direction with respect to one another so as to house the tip of a ski-mountaineering boot.

[0040] In a further fifth embodiment, shown in figures 5A and 5B, both elements 20, 30 rotate, having a rotation axis that is parallel to vertical axis Z, with respect to ski 100, and is capable of rotating, in opposite directions with respect to one another.

[0041] Such a fifth embodiment is substantially similar to the fourth embodiment mentioned above.

[0042] Substantially, the third embodiment, shown in figures 3A-3C, the fourth embodiment, shown in figures 4A-4C, and the fifth embodiment shown in figures 5A and 5B, have in common the fact that they comprise two elements 20,30 having a rotation axis that is parallel to vertical axis Z, with respect to ski 100, and being capable of rotating, in opposite directions with respect to opposite element 30, 20 as to house the tip of a ski-mountaineering boot.

[0043] The rotation axis of both elements 20,30, identified through pivot points 40, are specular, with respect to the longitudinal axis of ski 100 on which the front-retaining element 10 itself is fixed.

[0044] Front-retaining element 10 in the third embodiment, as well as in the fourth, and in the fifth embodiment, comprises at least one elastic holding element 6, adapted to be fixedly connected, for example through a pin "M", to a first end 20f of the first element 20, and to a second end 30f of the second element 30, so as to limit the rotation capability of both the elements, in the open configuration, and to apply a return force, allowing the elastic return of first element 20 and of second element 30 back into the resting or closed configuration, when the boot is correctly positioned in front-retaining element 10, according to the present invention.

[0045] Said elastic element 6 exerts, on such first and second element 20, 30, a force that is proportionally greater as their rotation increases.

[0046] In the third embodiment the position of pivot points 40 with respect to elastic element 6 and to pins 20c and 30c is such that pivot points 40, are behind said pins 20c and 30c. In detail as shown in figure 3A, first element 20 turns, preferably, in a clockwise direction, so as to allow the insertion of the boot; whereas, second element 30 turns, preferably, in an anti-clockwise direction.

[0047] Moreover, said pins 20c and 30c, are in turn positioned, behind with respect to elastic element 6, as clearly shown in figures 3A and 3C with respect to the tip of ski 100.

[0048] Such an embodiment requires the use of an elastic element 6 adapted to extend when the first and second element 20, 30, rotate around the respective pivot point 40 for the insertion/extraction of the boot, i.e. passing from the resting or closed configuration, to the open configuration.

[0049] Such a solution obtains a lever of the third order, requiring, therefore, a greater force in order to allow the

rotation of the first and second element 20, 30, opposed by elastic element 6, preventing the binding from possibly having the boot accidentally unhook once the front-retaining element 10 has been inserted.

[0050] In the fourth embodiment shown in figures 4A-4C and in the fifth embodiment, shown in figures 5A and 5B, the dimensions and the arrangement of the first and second element 20, 30, and in particular of said first end 20f of the first element 20, and of said second end 30f, are such as to obtain a housing 7 where elastic element 6 is positioned, as shown in figures 4C and 5A. In such embodiments, pivot points 40, where the first and second element 20, 30, rotate, are between elastic element 6 and said pins 20c and 30c. In detail as shown in figures 4A-4C and 5A, the first element 20 turns, preferably, in an anti-clockwise direction, so as to allow the insertion of the boot; whereas, second element 30 turns, preferably, in the clockwise direction.

[0051] Such fourth and fifth embodiment require the use of an elastic element 6 adapted to compress when the first and second element 20, 30, rotate around their respective pivot point 40 for the insertion/extraction of the boot, i.e. when passing from the resting or closed configuration, to the open configuration.

[0052] The distances between said three elements, as shown in figures 4C and 5A, obtain an advantageous lever, which requires less force in order to allow the rotation of the first and second element 20, 30, facilitating the insertion of the boot in front-retaining element 10.

[0053] The shape of elastic element 6 matches the shape of housing 7 formed by the first and second element thus being able to be arranged correctly in said housing 7.

[0054] In detail, as shown in the embodiments of figures 6A-6E said fastener 90, has a first end 91, adapted to closely fit into a first hole 14 comprised in a tongue 20b, 30b, and at least one recessed locking space 92 able to lock said tongues 20b, 30b in respectively one or more positions. Such at least one recessed locking space 92 is arranged at the opposite end of fastener 90 with respect to said first end 91.

[0055] Fastener 90, object of the present invention, moreover, comprises an eyelet 93 that is more or less closed, according to whether it is a version in which the fastener is removable or fixed, which is preferably arranged outside of the recessed locking space 92; eyelet 93 can have a tip of a ski pole held by a user inserted inside it, or a possible snare "L", inserted inside it, can be pulled so as to allow fastener 90 to be removed without the user having to bend over.

[0056] Figures 6A and 6B show two embodiments of fastener 90 according to the present invention. Fastener 90 ensures the flexibility through a holding spring 94, inserted at least partially inside a body of fastener 90. Spring 94 operates in compression inside a cartridge, which is visible in the tables; however, it can also operate in traction if it is a simple spring. Holding spring 94 exerts a mutual attraction force between said first and second element 20, 30. Spring 94 is configured so as to exert a resistance to the opening of the jaw formed by the first and second element 20, 30 and therefore in a position of minimum extension it keeps the two ends of fastener 90 as close as possible to one another.

[0057] Figures 6D and 6C represent variants of fastener 90 shown in figure 6A, said variants differ in that, on one of the two ends, a first variant only has a single recessed locking space 92 adapted to closely fit into hole 14. The second variant of figure 6D is on the other hand equipped with two recessed locking spaces 92, that are thus able to lock first and second element 20, 30 in two different positions.

[0058] Figure 6E shows a further embodiment of the fastener of figure 6A, in which first end 91 has a different shape so as to allow the close fitting of fastener 90 itself into corresponding hole 14. Moreover, eyelet 93 has been replaced with a hole passing through recessed space 92, in which a strap can be inserted so as to allow the removal of the fastener by using a tip of a ski pole that is held by a user.

[0059] Said ends 20f, 30f of the elongated appendages 20g 30g, comprise holes that are adapted to fix, for example through said pin "M", said elastic element 6 to first element 20 and to second element 30, as shown, for example in figures 7A and 7D.

[0060] Elastic element 6 can rotate around the axis of said pin "M". Figures 7A and 7B show elastic element 6 in two different positions, in particular in figure 7A elastic element 6 is arranged inside housing 7 thus contributing to keep the front-retaining element in the resting or closed configuration; indeed, said elastic element 6, once positioned inside the suitable housing 7, carries out a safety function preventing the involuntary rotation of first element 20 and of second element 30. Whereas, figure 7B shows the same elastic element 6 raised, extracted from such a housing 7, allowing the front-retaining element 10 to pass from the resting or closed configuration to the open configuration. Indeed, the rotation of elastic element 6 makes it possible to reduce the resistance to the rotation of elements 20 and 30, facilitating the hooking/releasing of the boot from front-retaining element 10.

[0061] Elastic element 6, preferably, comprises through holes 6a inside which a strap "L" is inserted, adapted for raising said elastic element 6, rotating around said pin "M".

[0062] The fifth embodiment of front-retaining element 10, shown in figures 5A and 7D comprises two elastic elements, preferably a first mobile elastic element 61, which can be constrained, for example through a pin "M", to ends 20f, 30f of said first element 20 and second element 30, so as to limit the rotation capability of both the elements, and to allow the elastic return; a second elastic element 62, preferably removable, adapted for limiting the rotation capability of both elements 20, 30, exerting a return force on said first and second element 20 and 30.

[0063] Both elastic elements 61 and 62 are adapted to keep said first and second element 20 and 30, in use,

in the resting or closed configuration.

[0064] Said first and second elastic elements 61 and 62 are positioned so that the first elastic element 61 exerts a return force that is lower with respect to the second elastic element 62. Preferably, in the present embodiment said housing 7 comprises tapered walls, so that the compression force is transformed into a force directed along a direction parallel to the vertical axis "Z", as shown in figure 8C.

[0065] The first elastic element 61 comes out from housing 20, for example, in the case in which the skier falls down; in such a case, the force exerted on said elastic element 61 is such as to cause the expulsion from housing 7, releasing the boot from binding 10. The inclination of the aforementioned tapered walls of housing 7 is such as to prevent the first elastic element 61 from coming out, due to the compression caused by the simple locking of the boot in binding 10. The second removable elastic element 62, can be replaced, by varying the elastic characteristics according to the requirements of the skier.

[0066] Moreover, in the fifth embodiment shown in figures 5A and 5B, said pins 20c, 30c, comprised in each tongue 20b and 30b has an inclination "α" with respect to an axis "Y", that is perpendicular to both the axis "Z", and to the longitudinal axis "X".

[0067] In detail, in figure 8A, said pins 20c, 30c have an inclination "α", preferably facing, in use, towards ski 100, less than 10°, for example less than 1°, so as to increase the hold of binding 10 on the boot.

[0068] As shown in figure 8B, said pin 20c, 30c, preferably, has, moreover, an inclination "β" that is lower than 10°, for example facing, in use, towards the rear end of ski 100.

[0069] Said inclination "β", preferably lower than 1°, facilitates the release of the boot from binding 10 in the case in which there is a fall.

[0070] Preferably, in the second, third, fourth and fifth embodiment, there are two inclined gaps 52, for example by 45°, with respect to the longitudinal axis of ski 100, preferably arranged in a specular way with respect to the longitudinal axis of the same ski 100.

[0071] Said gaps 52 are such as to channel the accumulated snow in the spaces of binding 10 during the movement of at least one of said elements 20, 30, allowing a rapid dispersal. Indeed, the excessive accumulation of snow can cause failure of binding 10 itself.

[0072] Preferably, as shown for example in figures 3B, 4B, 5B and 8B, the front-retaining element object of the present invention, has, moreover, at least one recess 53 on support bar 50 for each element 20 and 30. Preferably, recess 53 is positioned in a central area, for example in the front area, of support bar 50 of height that is lower with respect to the overall height of bar 50 itself and remains open on a lower face.

[0073] Therefore, when the front-retaining element 10 object of the present invention is installed on ski 100, recess 53 is limited above by the remaining wall of support bar 50 and, below, it is limited by the upper surface of ski 100.

[0074] Recess 53 has a concave shape, the dimensions of which match those of at least one bulge 20e, 30e present on the element 20 and/or 30adapted for rotating around axis "Z" (.

[0075] In particular, each bulge 20e, 30e is comprised on respective extension 20g and 30g of each element 20 and 30, and when closed, it is positioned parallel to support bar 50.

[0076] In detail each bulge 20e enters inside the corresponding recess 53 when first element 20 and/or second element 30 are in the closed position. The purpose of the recess 53 and of the corresponding bulge 20e is that of reinforcing front-retaining element 10 when used under strain, in particular in a crosswise direction with respect to the longitudinal axis of ski 100.

[0077] Preferably, front-retaining element 10, object of the present invention, moreover, has a plurality of anti-skid gripping holes 54, adapted for avoiding the sliding of front-retaining element 10 itself on ski 100.

[0078] The front-retaining element for a ski-mountaineering binding makes it possible to removably constraining the tip of a boot without the necessity of a precise adjustment of flexible lateral tongues, the resistance of which to the release of the aforementioned tip can vary according to a multitude of factors amongst which the temperature and the ageing of the material.

[0079] The release of the tip of the boot therefore does not occur through a lateral flexing of the tongues 20b, 30b, or swelling outwards, but usually through a rotation of at least one element 20, 30.

[0080] According to the type of material and the degree of arching of fastener 90, it is moreover possible to obtain a more or less high resistance to the opening of the first and second element 20, 30, in the case in which there is a collision of the skier, impact or fall.

[0081] For the variation of the resistance to the opening of the first and second element 20, 30, it is possible to vary elastic element 6, which carries out a function of elastic return of the first and second element 20, 30, by using traction elastomers, with different elastic characteristics, or springs.

[0082] The fourth and fifth embodiment, in which at least one elastic element 6, 61, 62 is applied, which rotates around the fixing pin "M", making it possible to vary the resistance to the rotation, as a function of the moment of use. Indeed, through said rotating elastic element 6 it is possible to reduce the resistance to the rotation of first element 20 and of second element 30, during the hooking and release step of the boot, and again increase the resistance during the use by the user during ski-mountaineering.

[0083] The front-retaining element here described can undergo some variants, so as to adapt the front-retaining element to the requirements of the user and to his skiing level, by carrying out modifications and additions, that are obvious to a man skilled in the art, without for this reason departing from the scope of protection provided

by the attached claims.

[0084] The technical characteristics described in particular embodiments can also be adapted to the other embodiments, without for this reason departing from the scope of protection provided by the attached claims.

[0085] The ski-mountaineering front-retaining element, according to the present invention with suitable modifications of settings made by the manufacturer, known to a man skilled in the art, the front-retaining element, according to the present invention makes it possible to release the boot from said front-retaining element also in the case in which there is a fall, thus increasing the safety of the skier.

Claims

1. Front-retaining element (10) for a ski-mountaineering binding, fixed to a ski (100), comprising a first element (20) and a second element (30) for holding a tip of a ski boot; said first and second element (20,30) are made with respective tongues (20b, 30b); each of said tongues (20b, 30b) comprises a pin (20c, 30c) for the insertion in a recess of a tip of a ski-mountaineering boot for locking it;
said locking is obtained through a rotation of at least one of said elements (20, 30) along an axis that is parallel to the vertical axis (Z), without flexing,;
characterised in that it comprises at least one fastener (90) for keeping said first element (20) and said second element (30) in a resting or closed operative configuration.

2. Front-retaining element according to claim 1, wherein said fastener (90) is inserted, at a first end (91) and at a second end thereof, into a pair of holes (14) respectively positioned on the tongues (20b, 30b).

3. Front-retaining element according to claim 2, wherein said fastener (90) comprises one or more recessed locking spaces (92) for locking said tongues (20b, 30b) in respectively one or more positions.

4. Front-retaining element according to claim 2, wherein said fastener (90) has a sinuous or arch-shaped central portion conferring elasticity to the traction of the fastener (90) itself, in a direction oriented on the joint between its two ends.

5. Front-retaining element according to claim 2, wherein said fastener (90) comprises a holding spring (94); said spring (94) being at least partially inserted inside a body of said fastener (90); the holding spring (94) exerting a mutual attraction force between said first and second element (20, 30), and comprising a position of minimum extension in which it keeps a first, second end of the fastener (90) as close as possible with respect to one another.

6. Front-retaining element according to claim 1, wherein said fastener (90), in use and when said first, second element (20, 30) are in the resting or closing operative configuration, is positioned crosswise with respect to a direction of maximum extension of said ski (100).

7. Front-retaining element according to claim 1, wherein both of said elements (20, 30) rotate along a respective axis that is parallel to the vertical axis (Z).

8. Front-retaining element according to claim 7, wherein the rotation of the first element (20) rotates along an axis that is parallel to the vertical axis (Z) with a rotation direction that is opposite with respect to the second element (30).

9. Front-retaining element according to claim 7, said front-retaining element comprises at least one elastic holding element (6), that is able to be fixedly connected to a first end (20f) of the first element (20), and to a second end (30f) of the second element (30), so as to limit the rotation capability of both the elements (20, 30) themselves, and to exert a return force on said first and second element (20, 30).

10. Front-retaining element according to claim 6, wherein the pivot points (40), where the first (20) and second element (30) rotate, are between the elastic element (6) and said pins (20c e 30c), forming a lever of the first order.

11. Front-retaining element according to claim 1, wherein every pin (20c, 30c) has an inclination (α), with respect to an axis (Y) that is perpendicular both to the vertical axis (Z) and to the longitudinal axis of the ski (100), adapted for strengthening the hold of the binding (10) on the boot.

12. Front-retaining element according to claim 1 or 11, wherein every pin (20c, 30c) has an inclination (β), with respect to an axis (Y) that is perpendicular both to the vertical axis (Z) and to the longitudinal axis of the ski (100), adapted to facilitate the release of the boot from the binding (10) in the case in which there is a fall.

13. Front-retaining element according to claims 11 and 12, wherein said inclinations (α) and (β) are less than 10°.

14. Front-retaining element according to claim 1, wherein the front-retaining element (10) comprises a support bar (50), which in use is fixedly connected to the ski (100), and comprises at least one gap (52) adapted to expel snow that has been accumulated, below the binding (10), following the rotation of said at least one element (21, 22).

15. Front-retaining element according to claim 1, wherein said tongues (20b, 30b) are arranged orthogonal with respect to the plane on which the ski (100) lies, parallel to said vertical axis (Z).

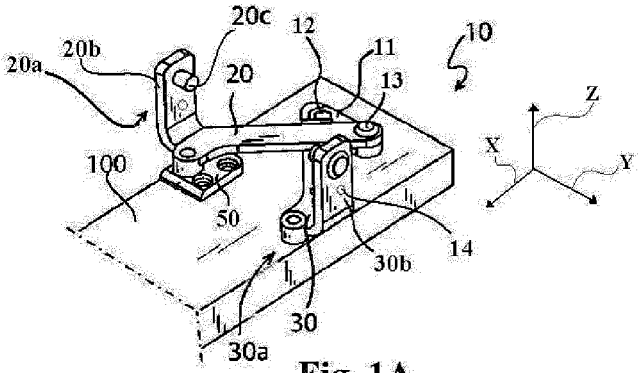


Fig. 1A

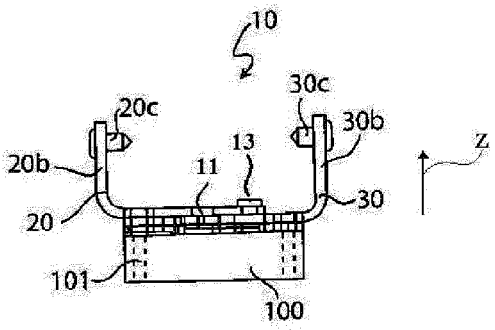


Fig.1B

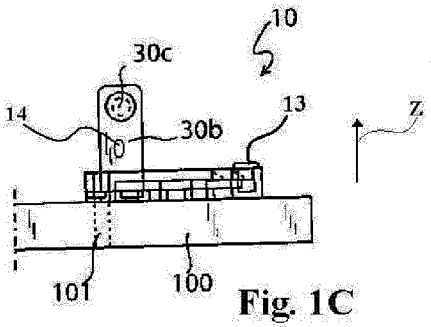


Fig. 1C

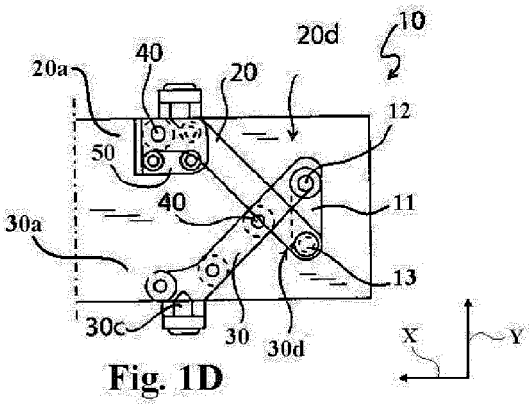


Fig. 1D

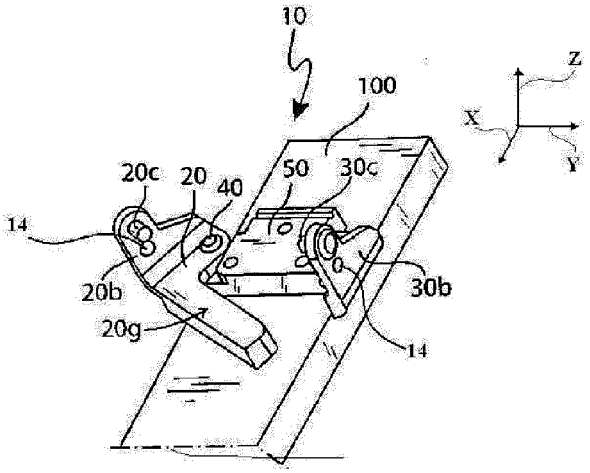


Fig. 2A

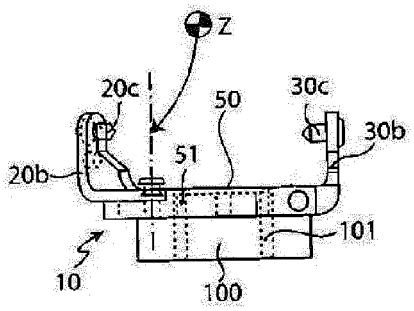


Fig. 2B

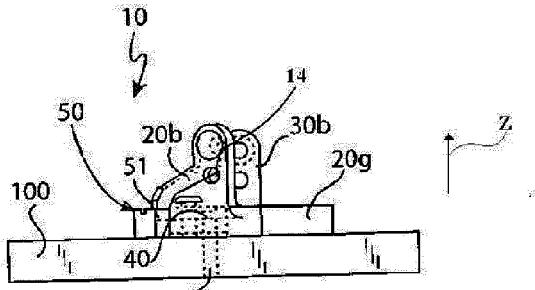


Fig. 2C

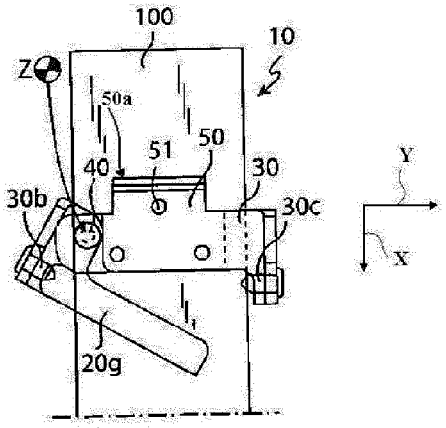


Fig. 1D

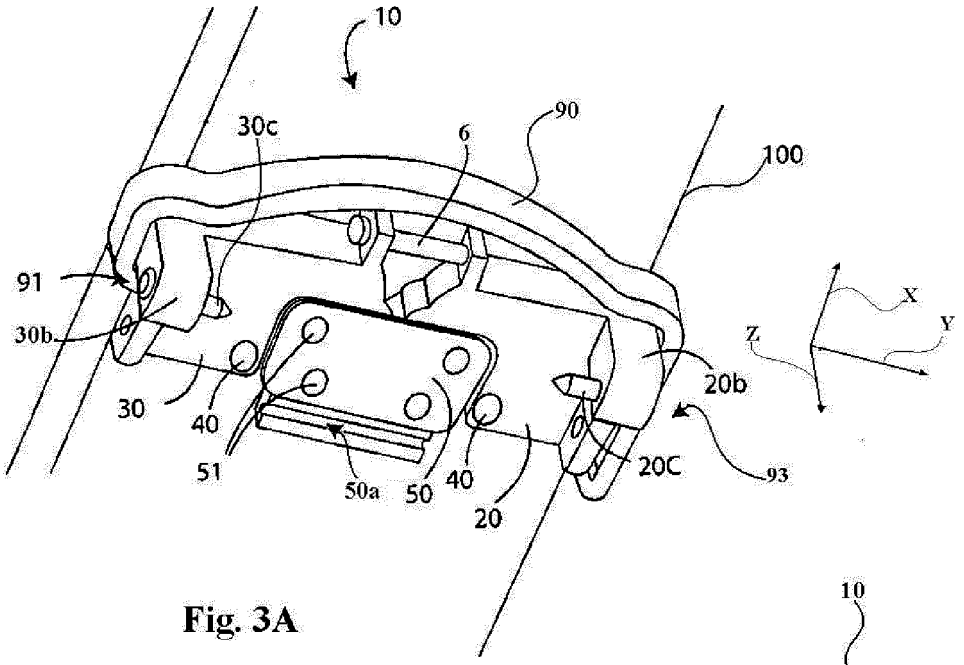


Fig. 3A

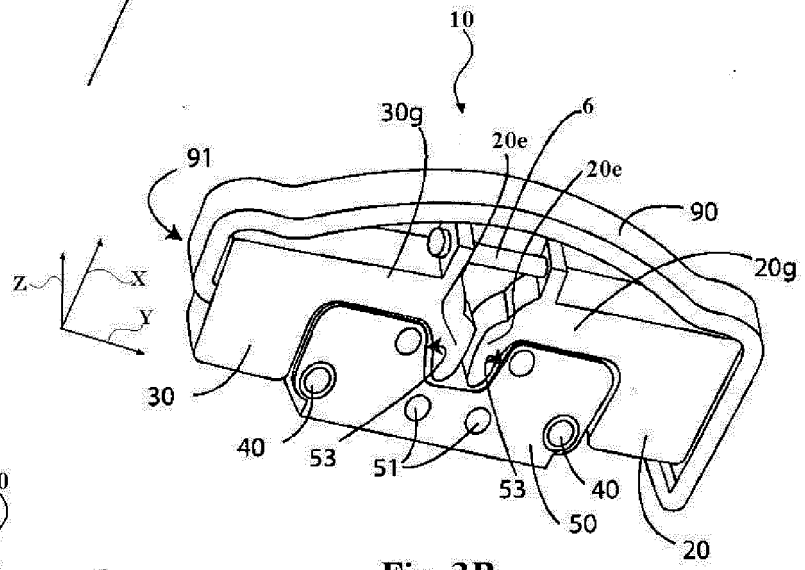


Fig. 3B

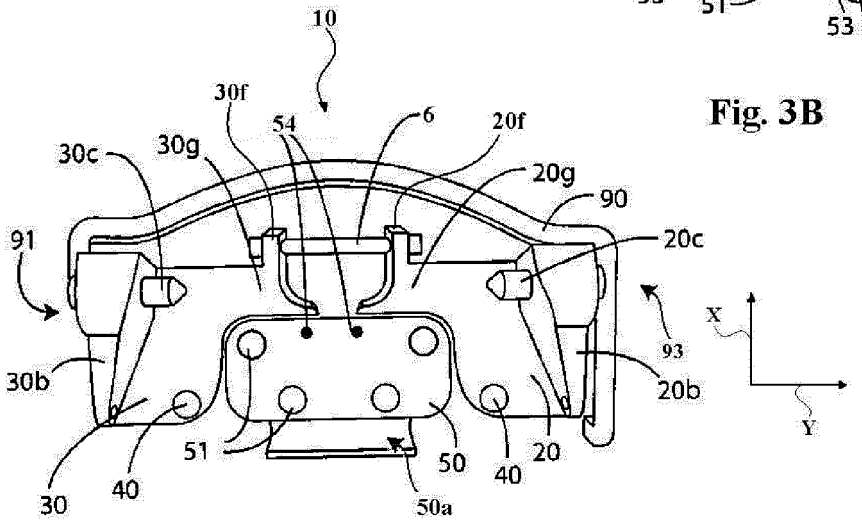


Fig. 3C

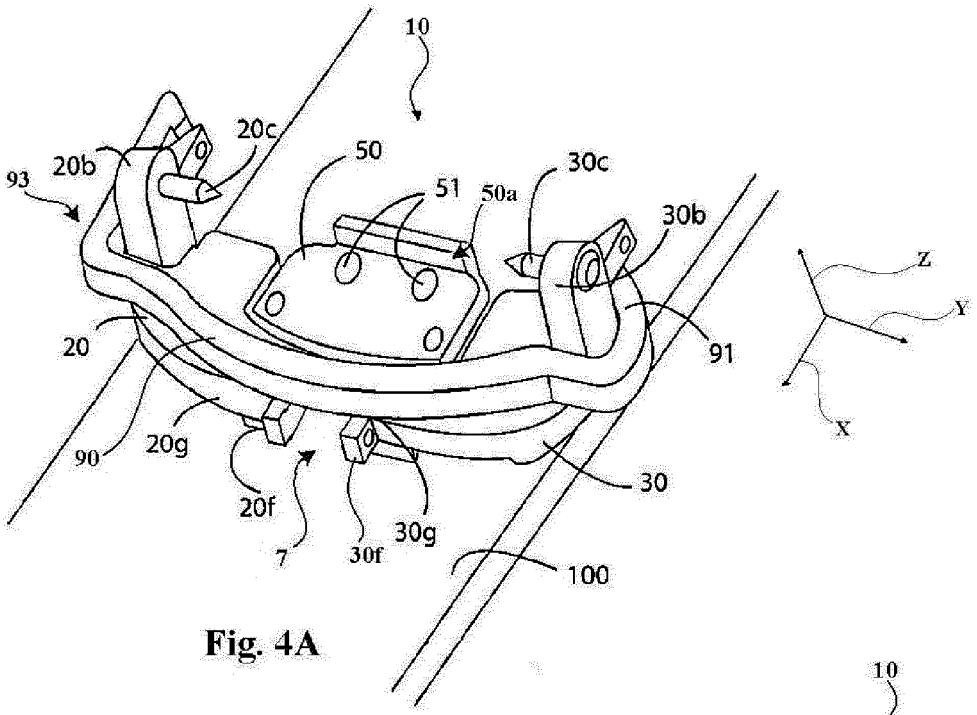


Fig. 4A

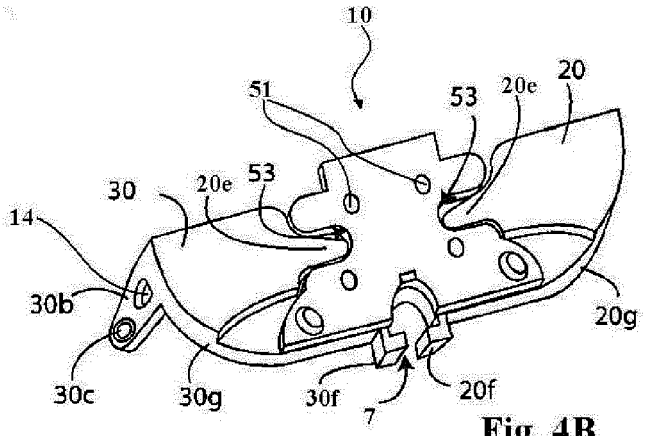


Fig. 4B

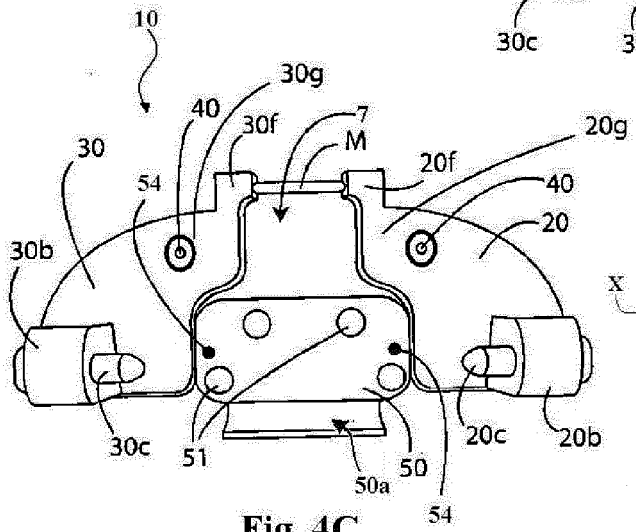
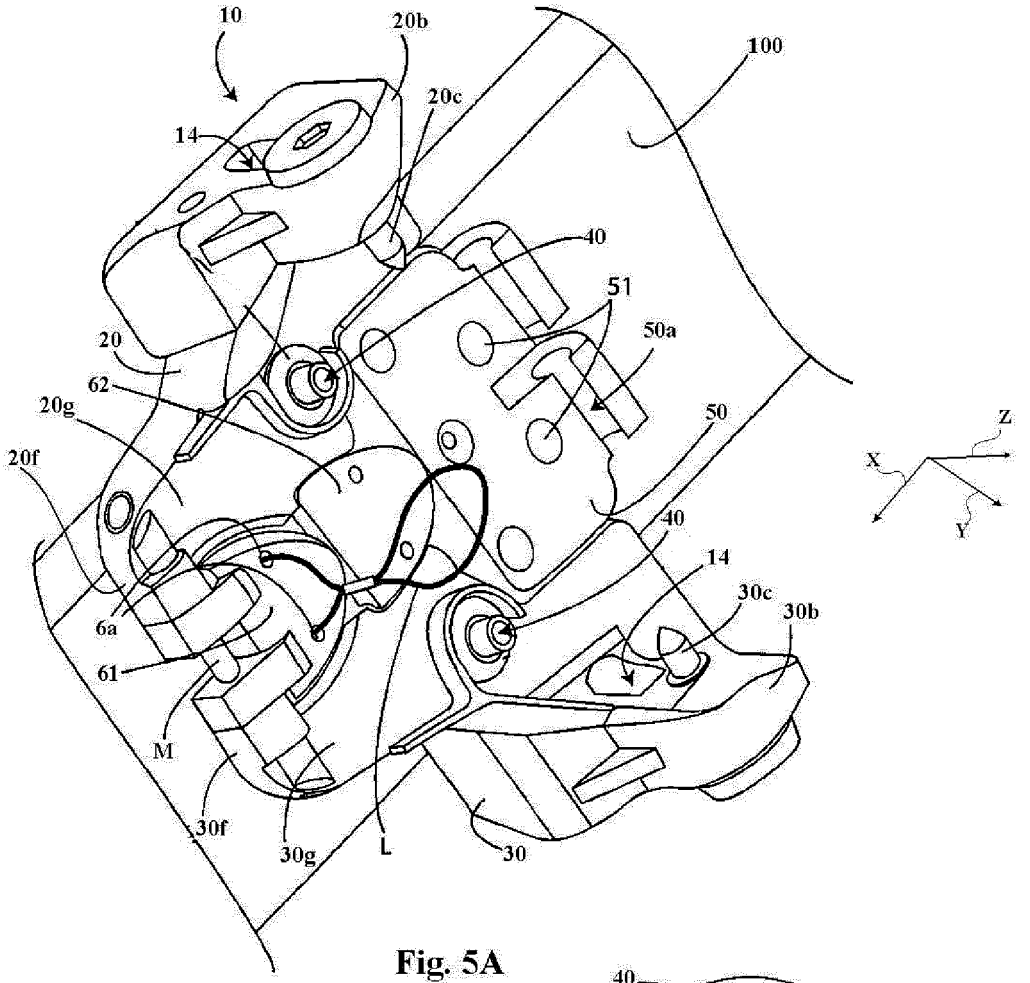


Fig. 4C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20b
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20c
14
40
51
50a
20
62
20g
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Z
X
Y
20f
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14
30c
30b
6a
61
M
30f
30g
L
30

Fig. 5A

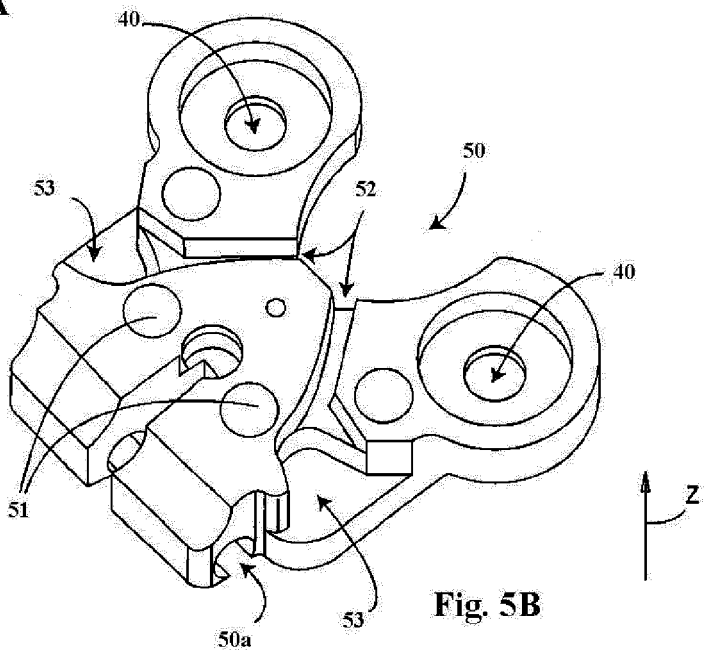
40
50
53
52
40
51
Z
50a
53

Fig. 5B

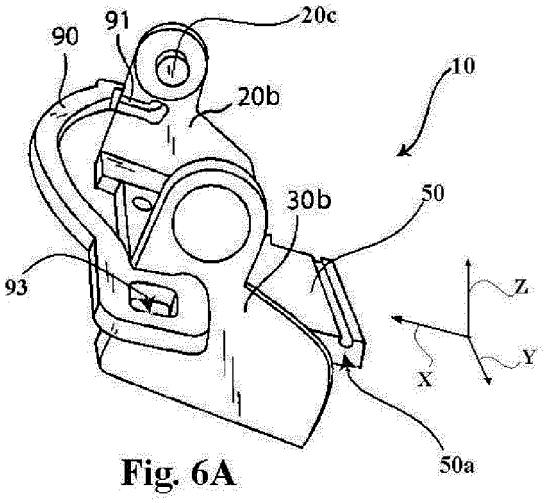

Fig. 6A

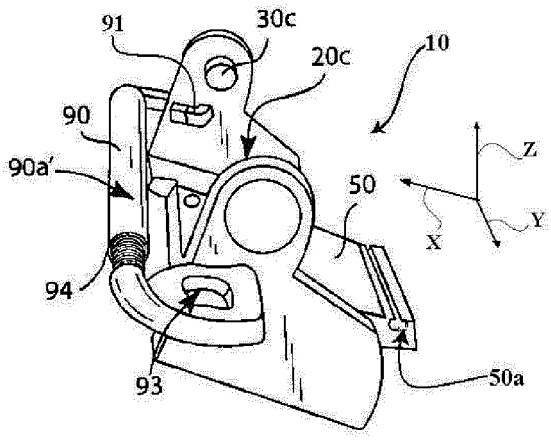

Fig. 6B

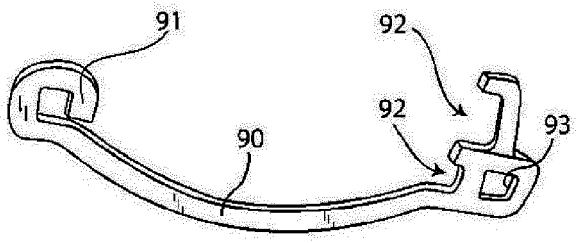

Fig. 6C

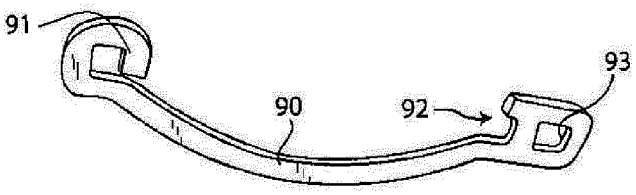

Fig. 6D

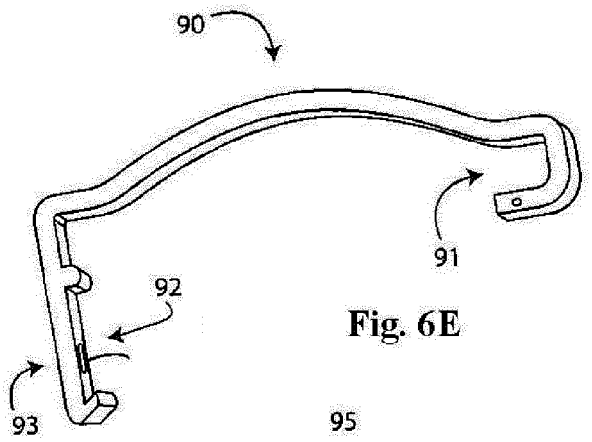

Fig. 6E

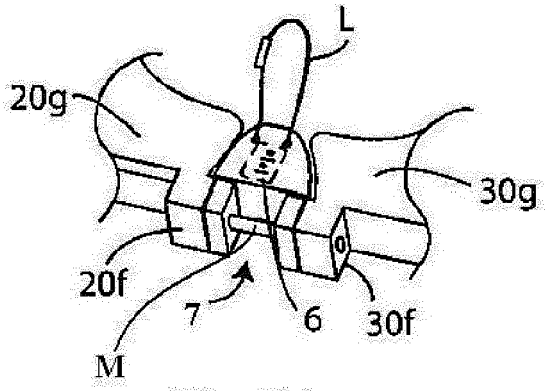

Fig. 7A

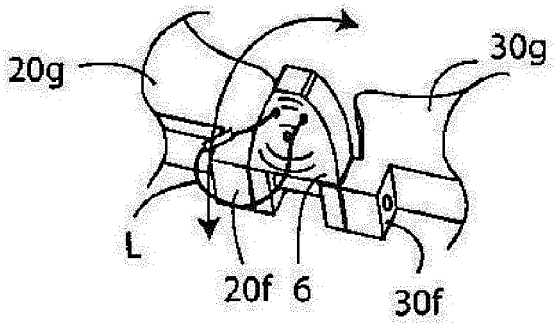

Fig. 7B

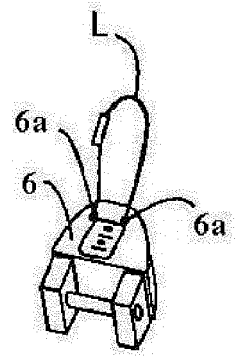

Fig. 7C

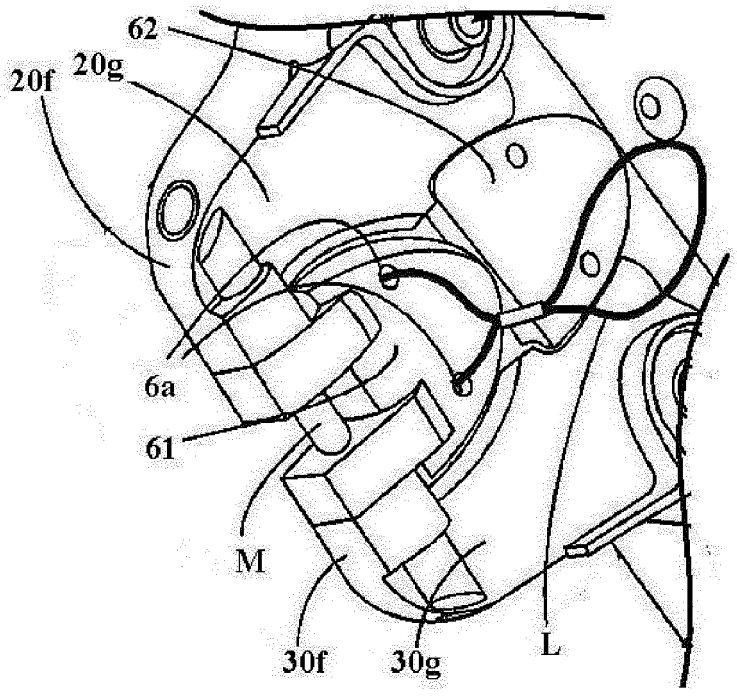

Fig. 7D

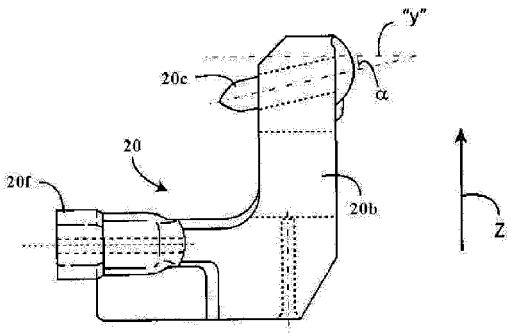

Fig. 8A

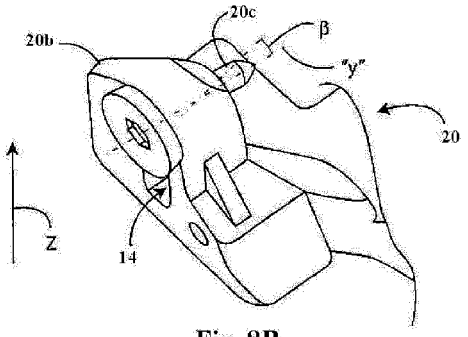

Fig. 8B

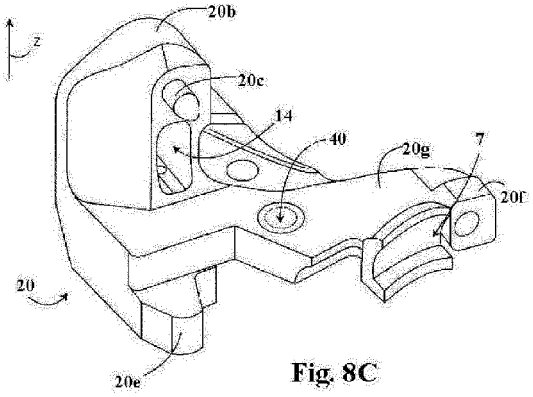

Fig. 8C

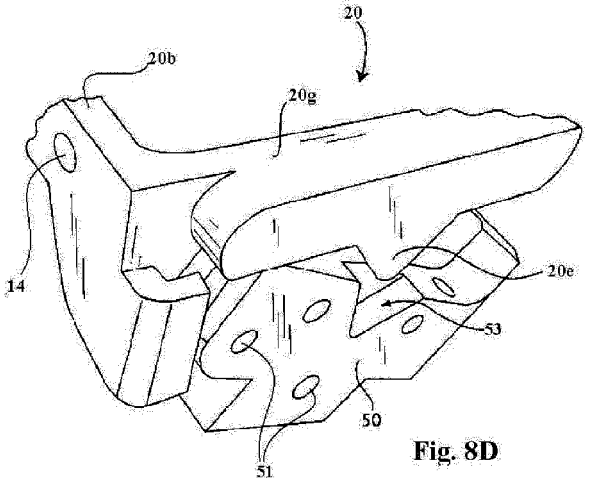

Fig. 8D

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EUROPEAN SEARCH REPORT

Application Number
EP 12 15 3110

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X Y A	WO 2007/010392 A2 (SKI TRAB S R L [IT]; TRABUCCHI DANIELE [IT]) 25 January 2007 (2007-01-25) * paragraph [0019] - paragraph [0023]; figures 1-6 *	1,6-8,15 10 2-5,9, 11-14	INV. A63C9/08 A63C9/086
X A	US 4 348 036 A (SETTEMBRE RICHARD J) 7 September 1982 (1982-09-07) * column 2, line 20 - column 3, line 20; figure 1 *	1,7-9,15 2-6, 10-14	
X	DE 27 06 111 A1 (FROER WERNER) 17 August 1978 (1978-08-17) * page 3, line 1 - page 4, line 15; figure 1 *	1,6-8,15	
Y	US 4 352 508 A (SPADEMAN RICHARD G) 5 October 1982 (1982-10-05) * column 3, line 56 - column 4, line 18; figure 8 *	10	
A,D	US 3 797 841 A (MC AUSLAND R) 19 March 1974 (1974-03-19) * column 1, line 32 - column 1, line 48 * * column 2, line 31 - column 4, line 12; figures 2,3,4 *	1-15	TECHNICAL FIELDS SEARCHED (IPC) A63C
A	FR 2 945 185 A1 (GIGNOUX SARL [FR]) 12 November 2010 (2010-11-12) * page 19, line 29 - page 20, line 21; figures 2,18,19,20 *	1-15	
T	EP 0 199 098 A2 (BARTHEL FRITZ) 29 October 1986 (1986-10-29) * column 5, line 11 - column 10, line 8; figures 1,2,3 *	1-15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 July 2012	Murer, Michael

CATEGORY OF CITED DOCUMENTS

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