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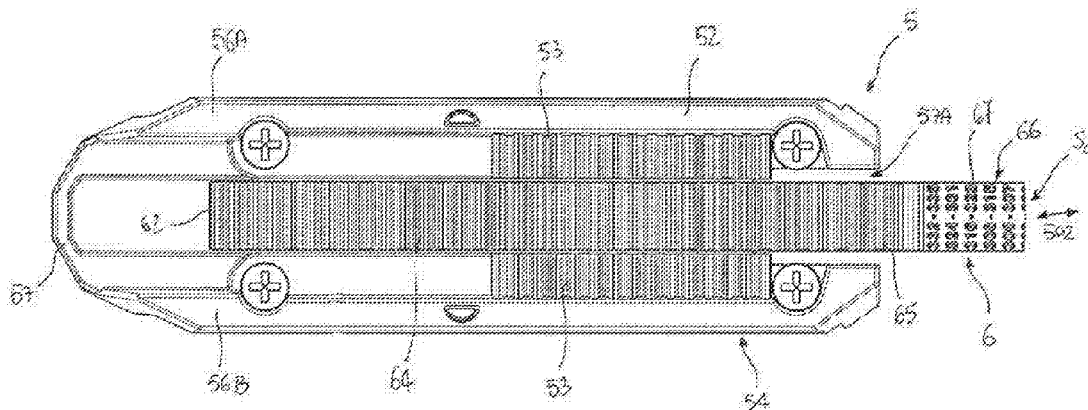
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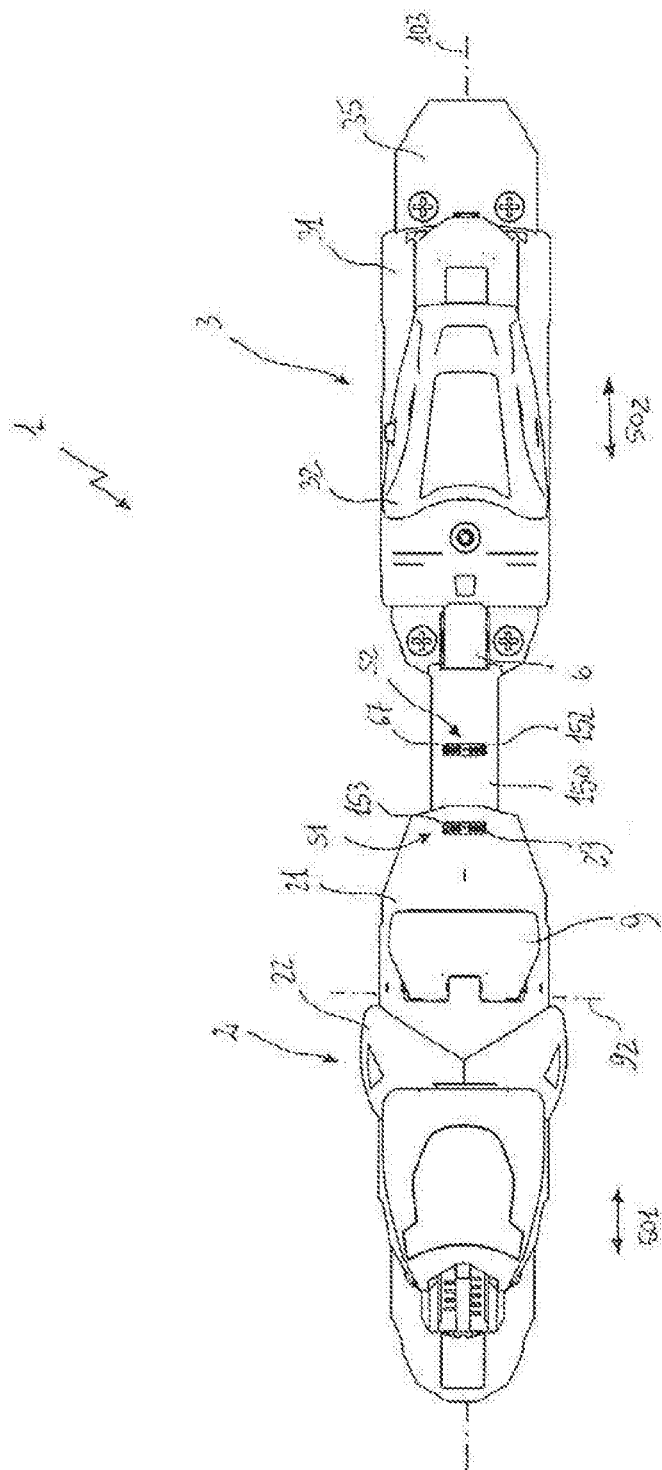
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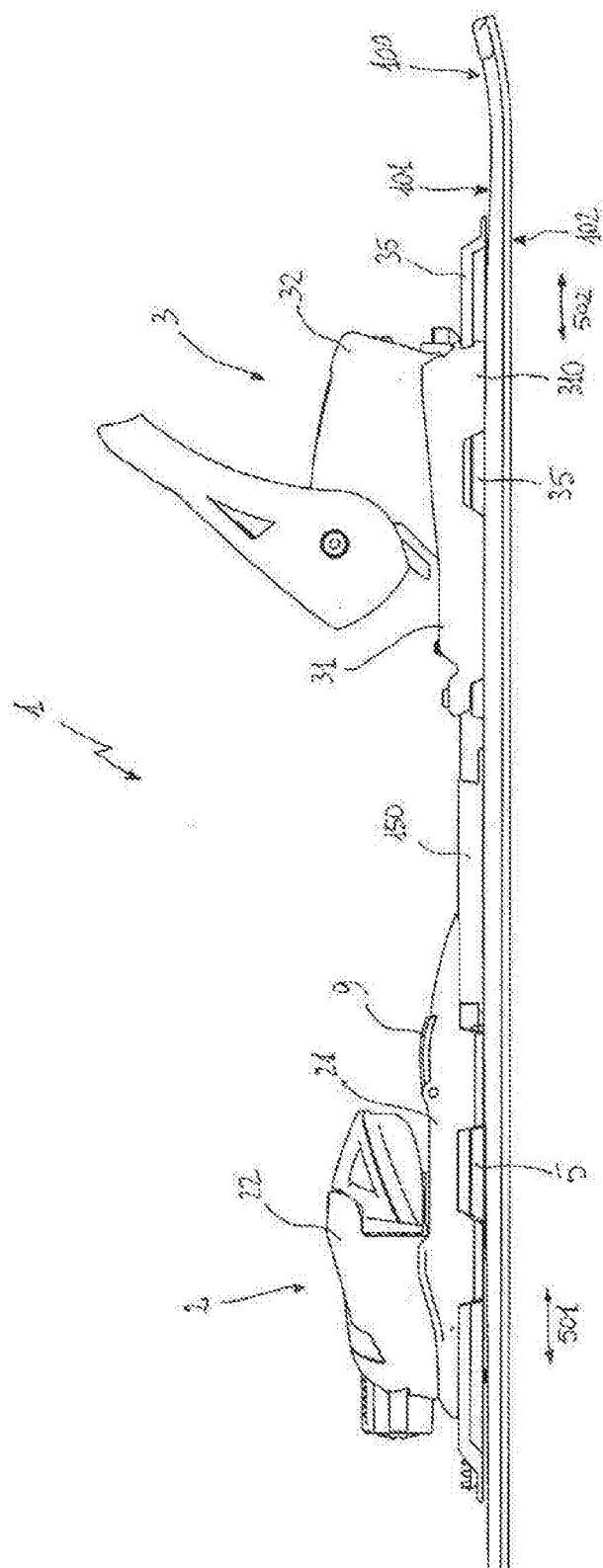
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Ski binding (1) comprising a toe binding (2) and a heel binding (3), configured to be operatively associated to a ski (100) at an upper surface (101) of said ski, and a blocking and adjusting mechanism (4), reversibly actuatable by the user, by means of an operation lever, between a blocking position, at which said toe binding and said heel binding are solidly connected to said ski in a fixed position, and a release position, at which said toe binding and said heel binding are free to slide with respect to said ski.





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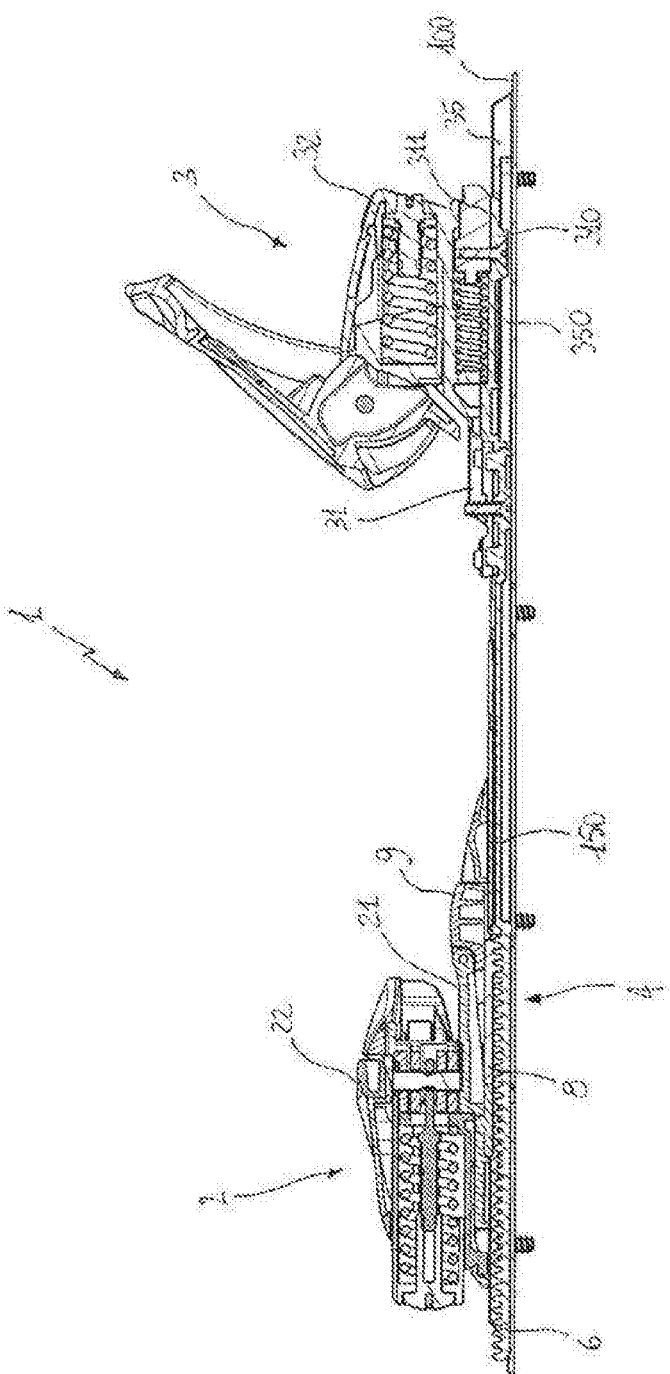
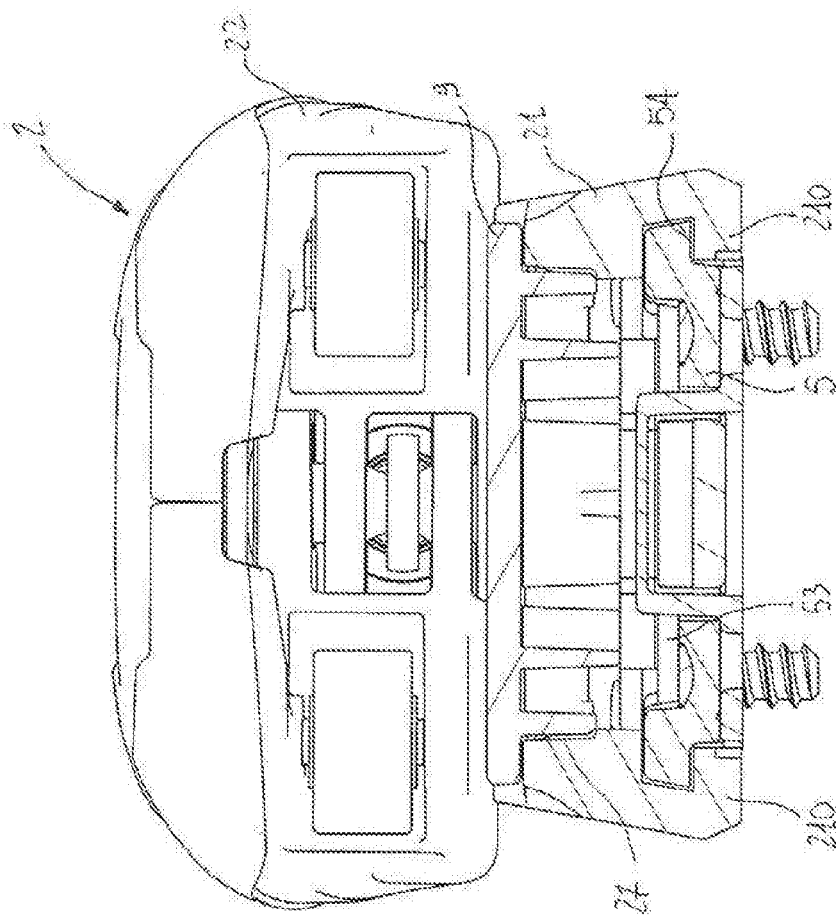
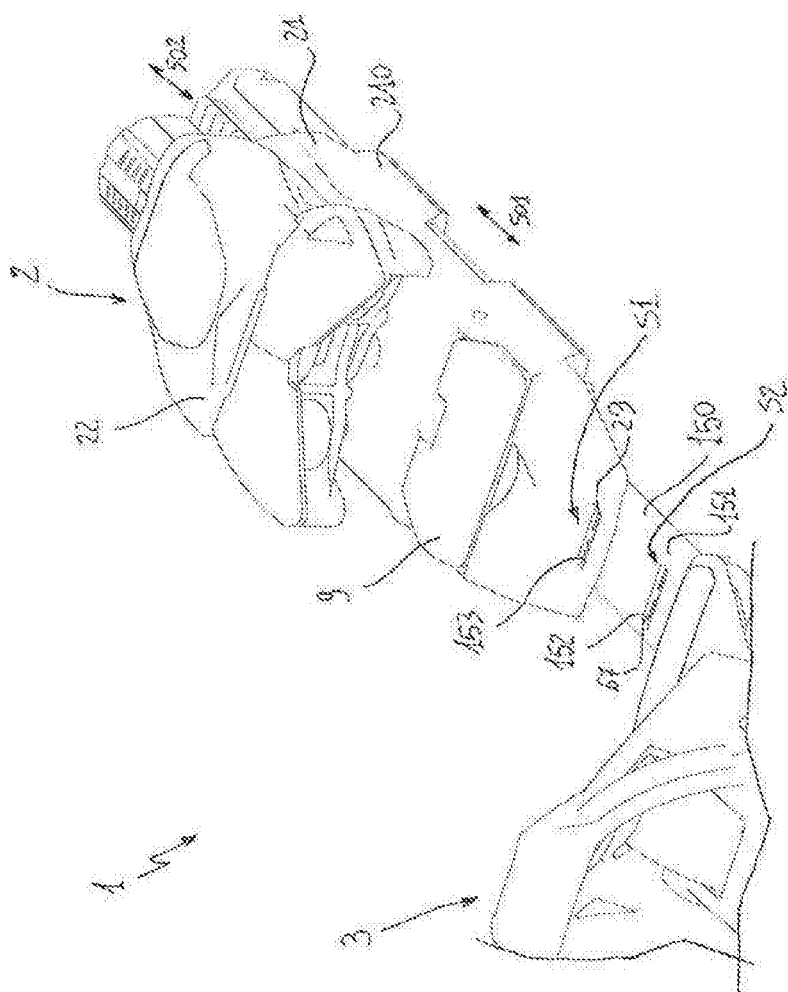


Fig. 3



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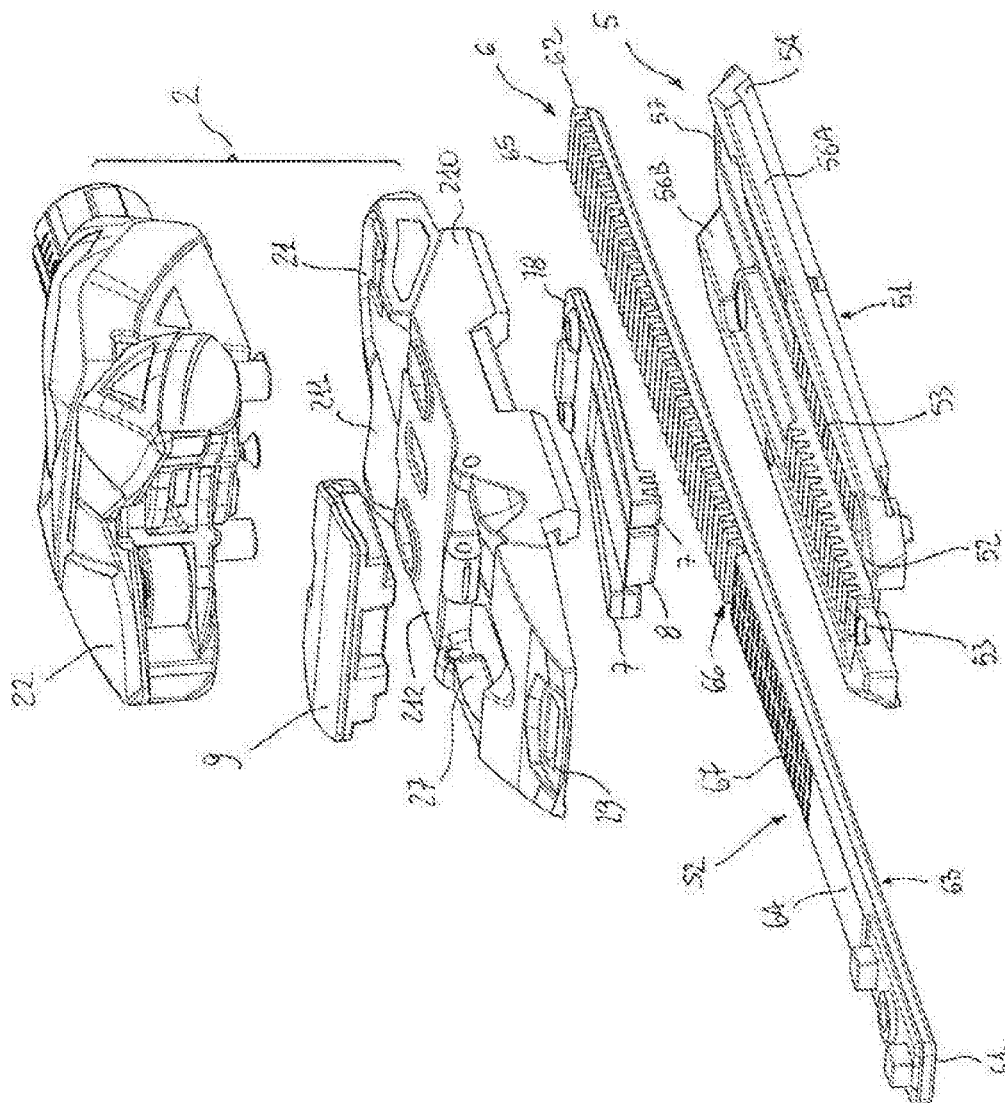


Fig. 6

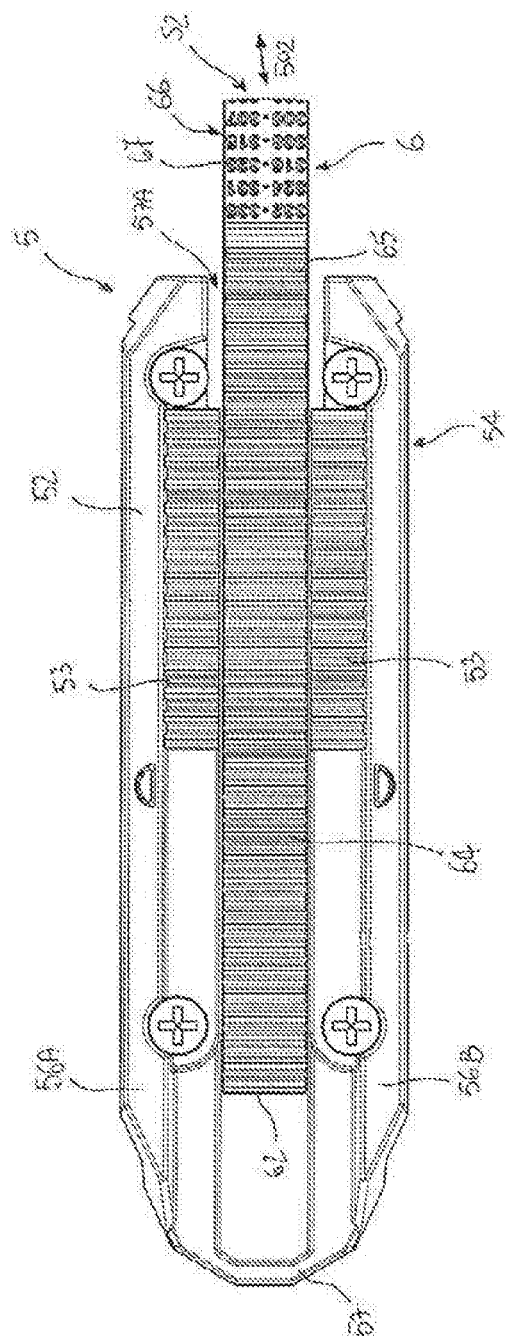


Fig. 7

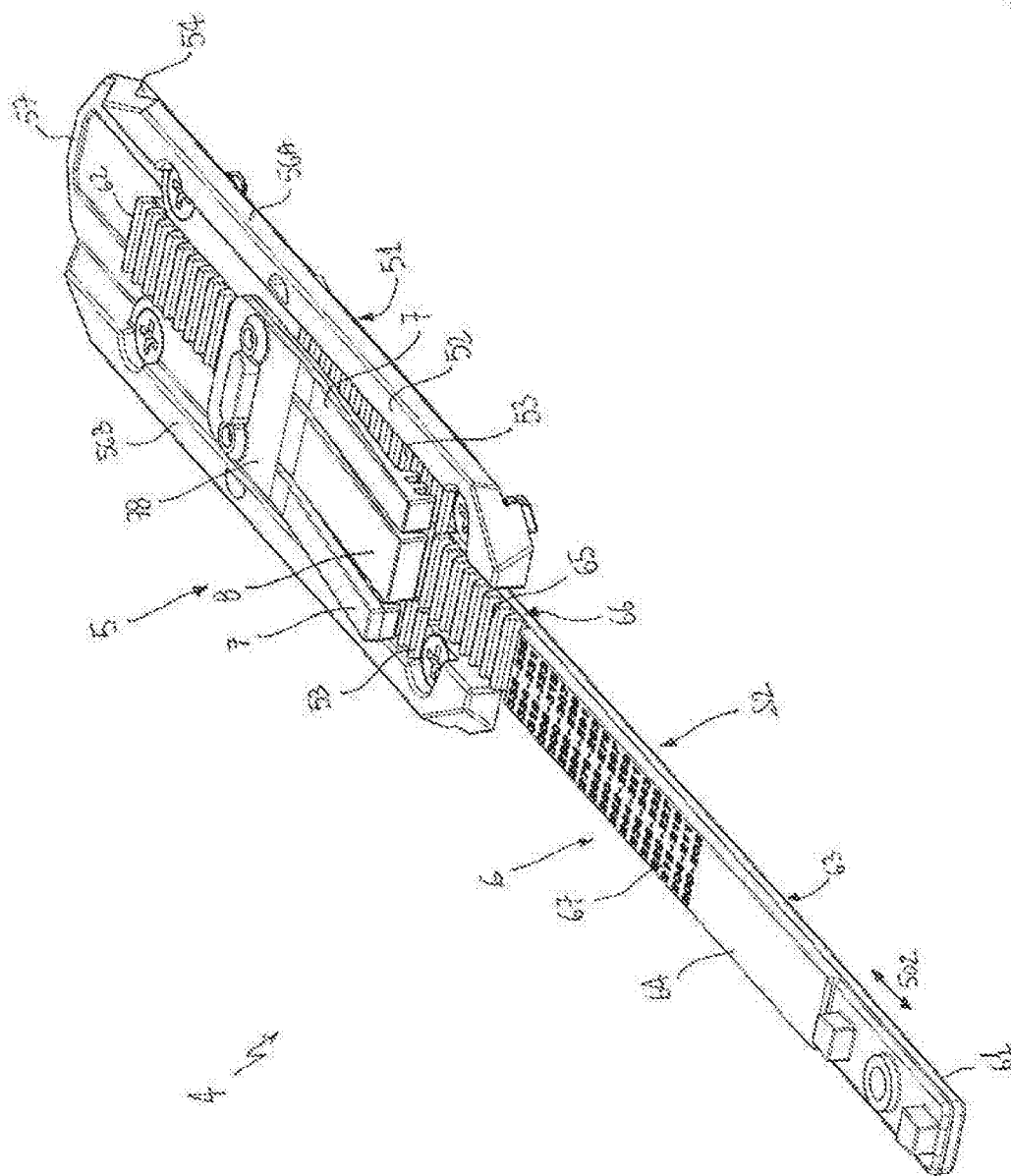
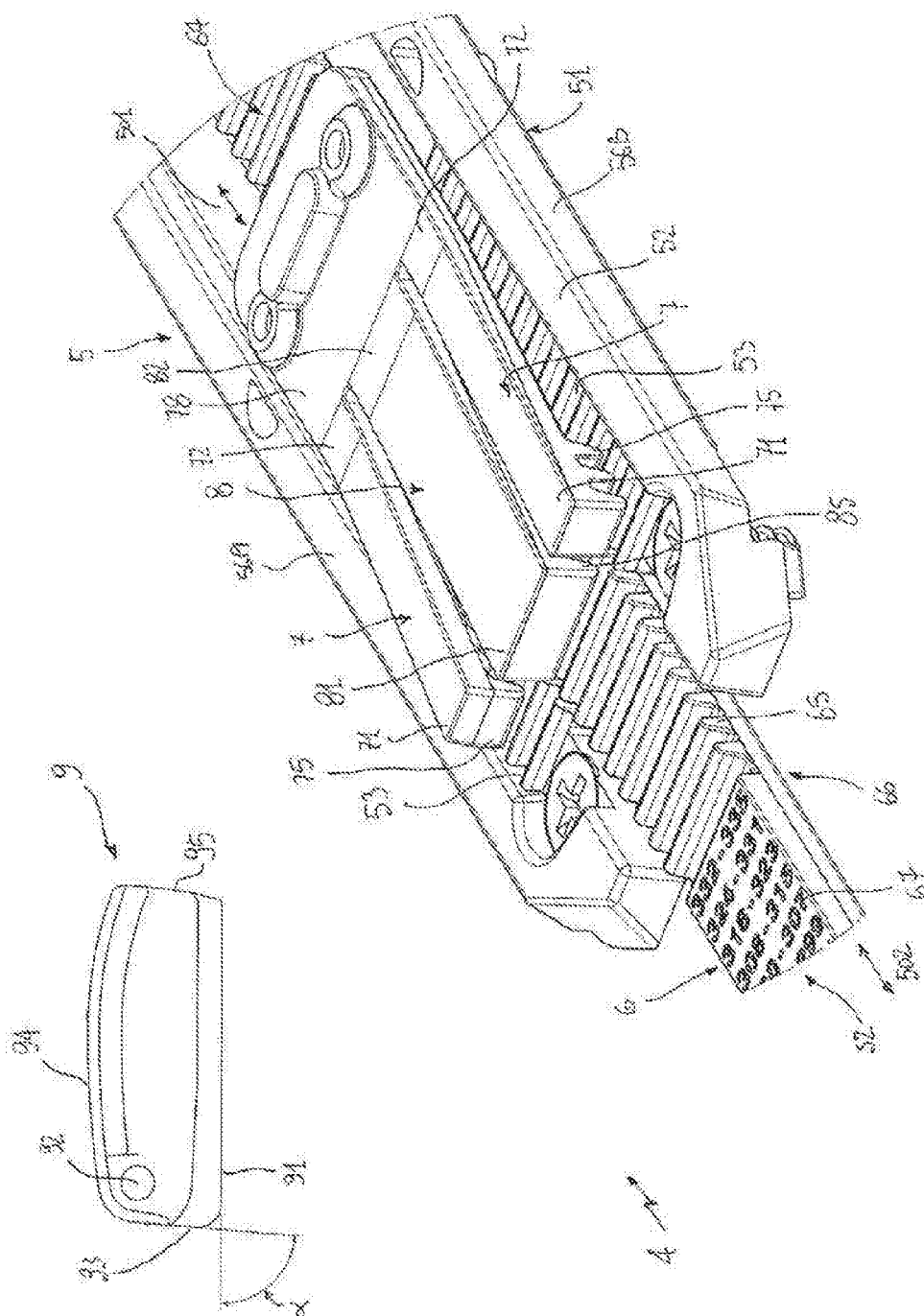


Fig. 8



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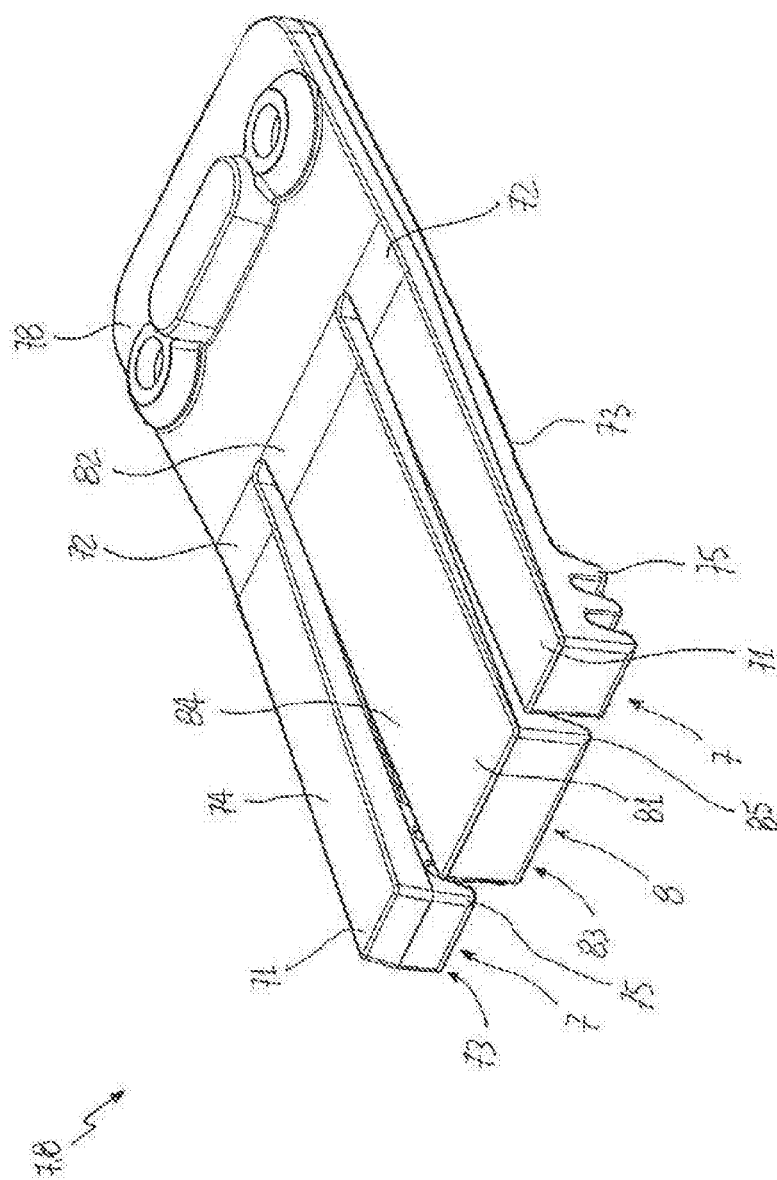


Fig. 9A

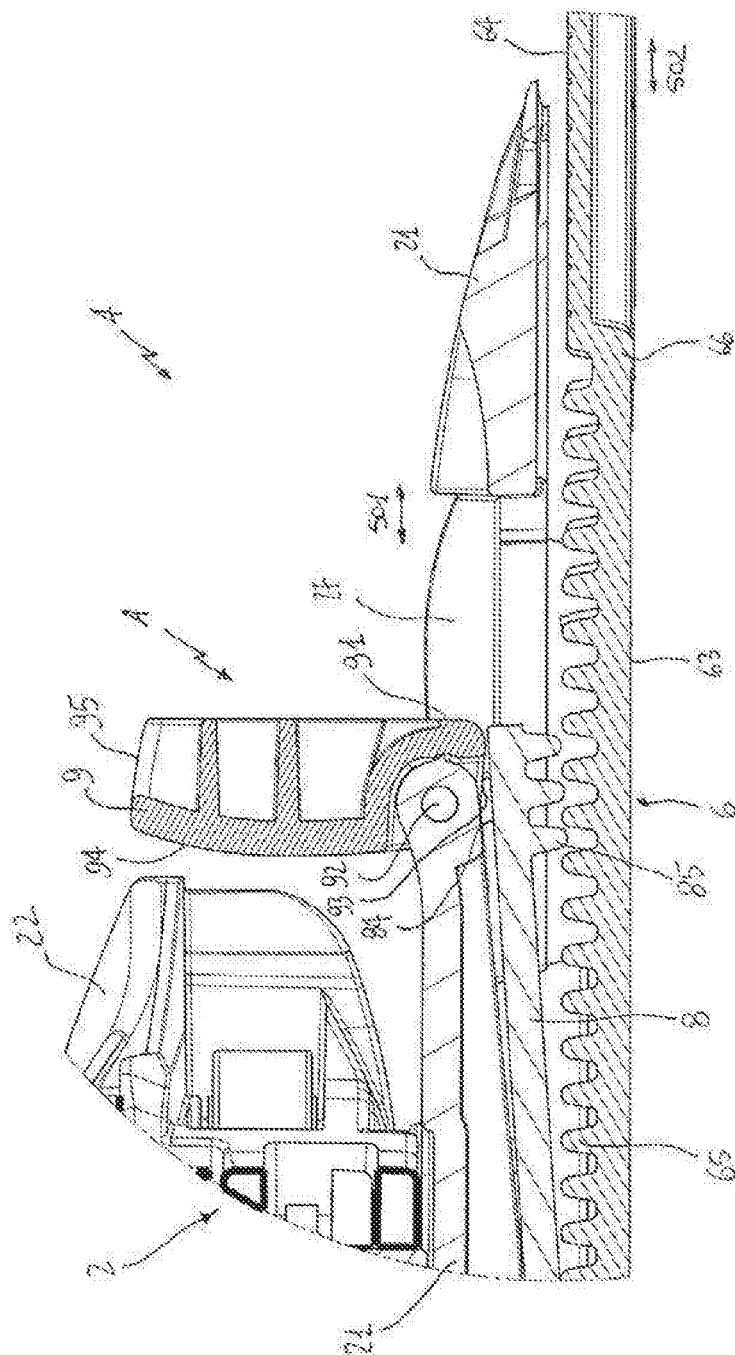


Fig. 10

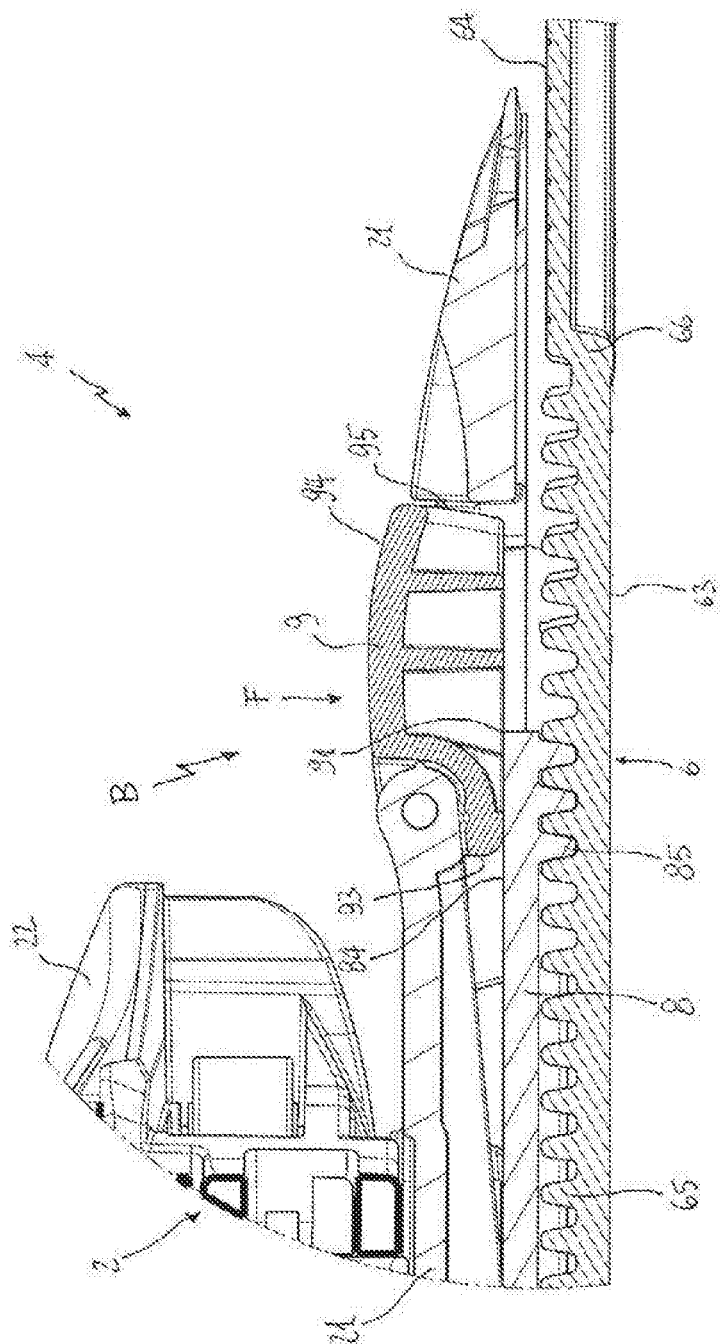
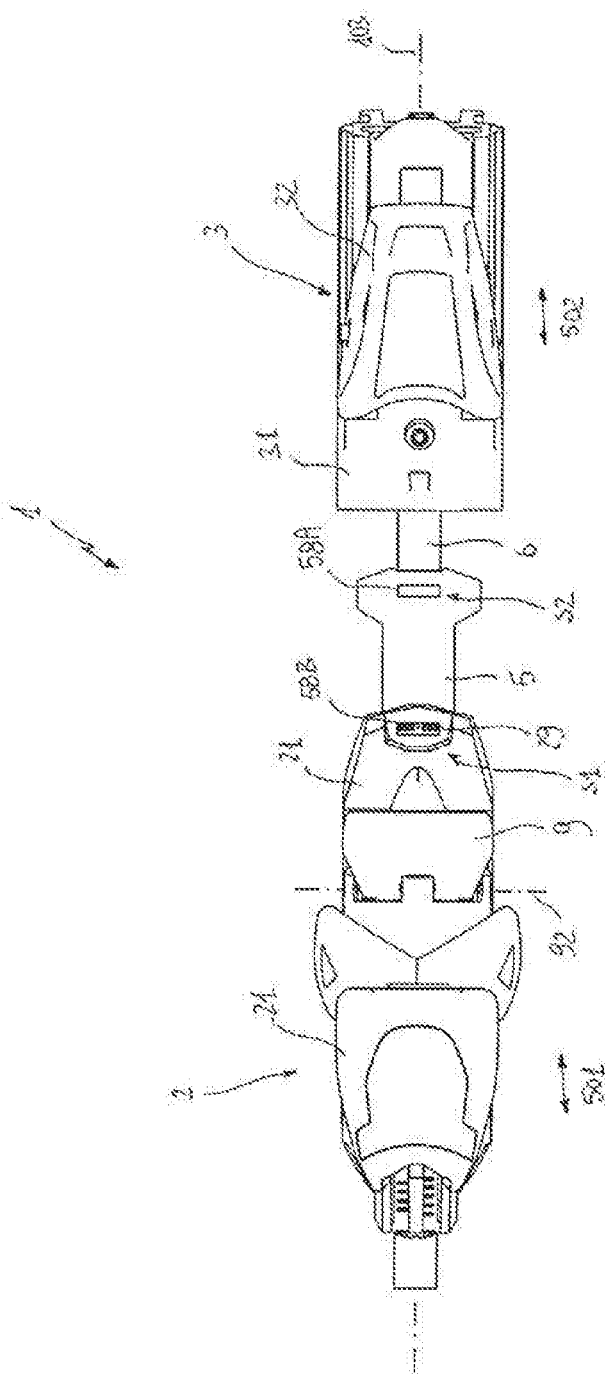
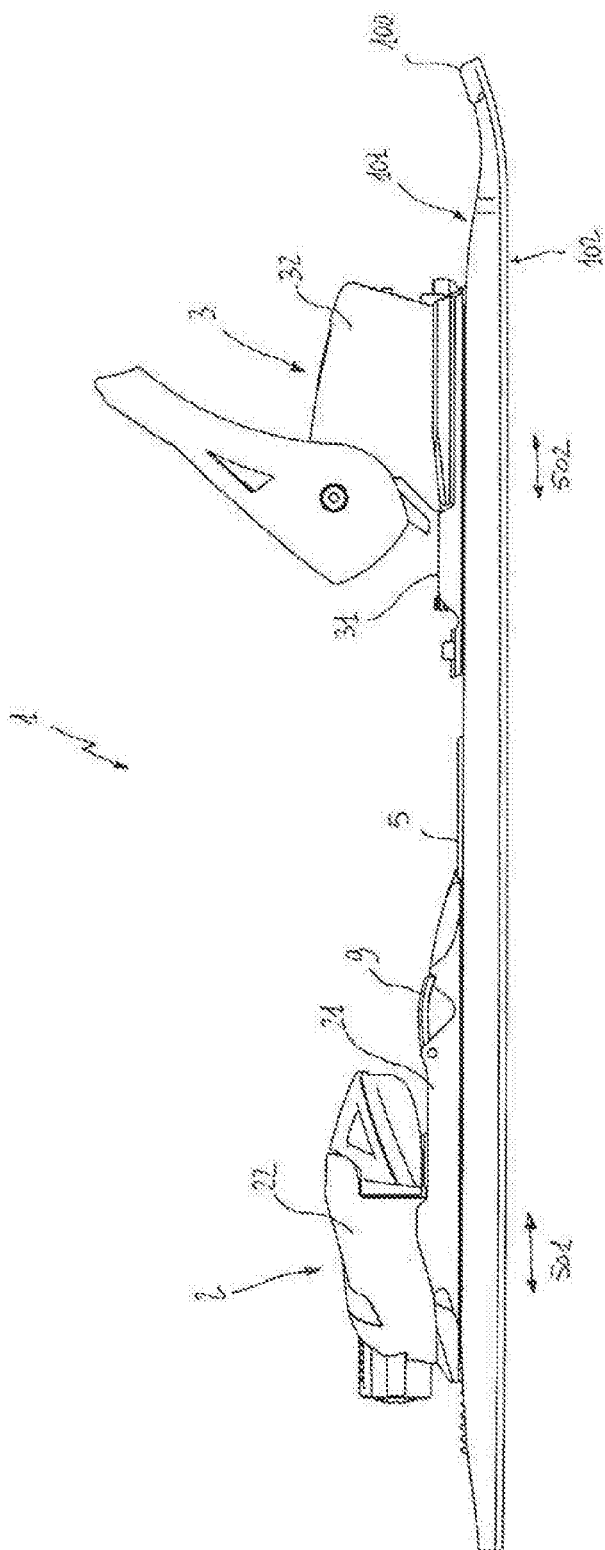


Fig. 11





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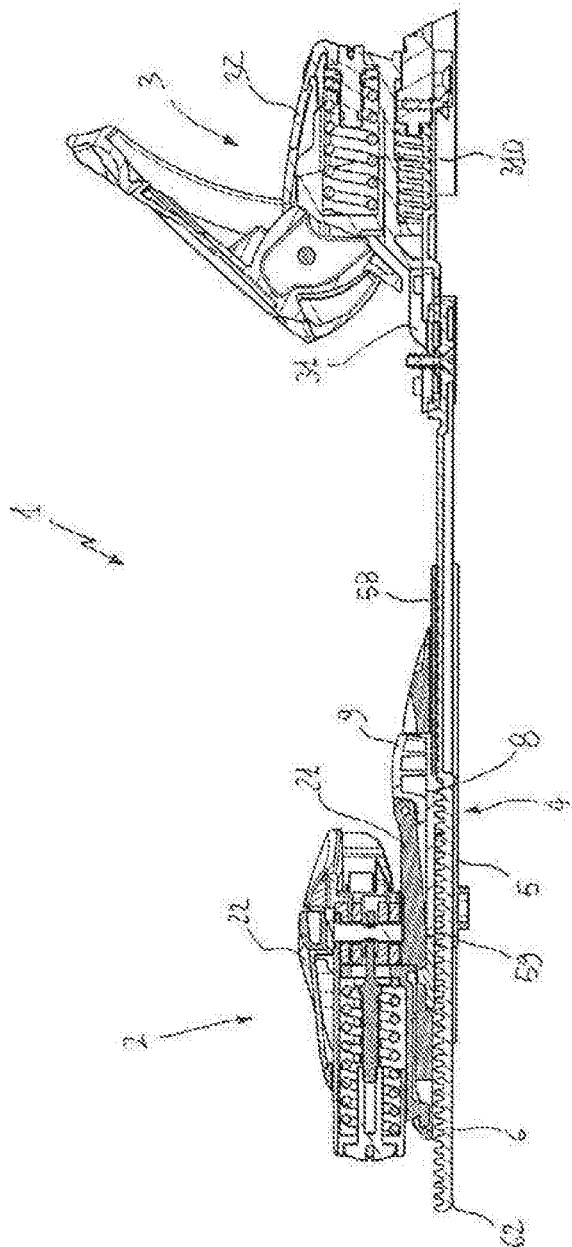


Fig. 14

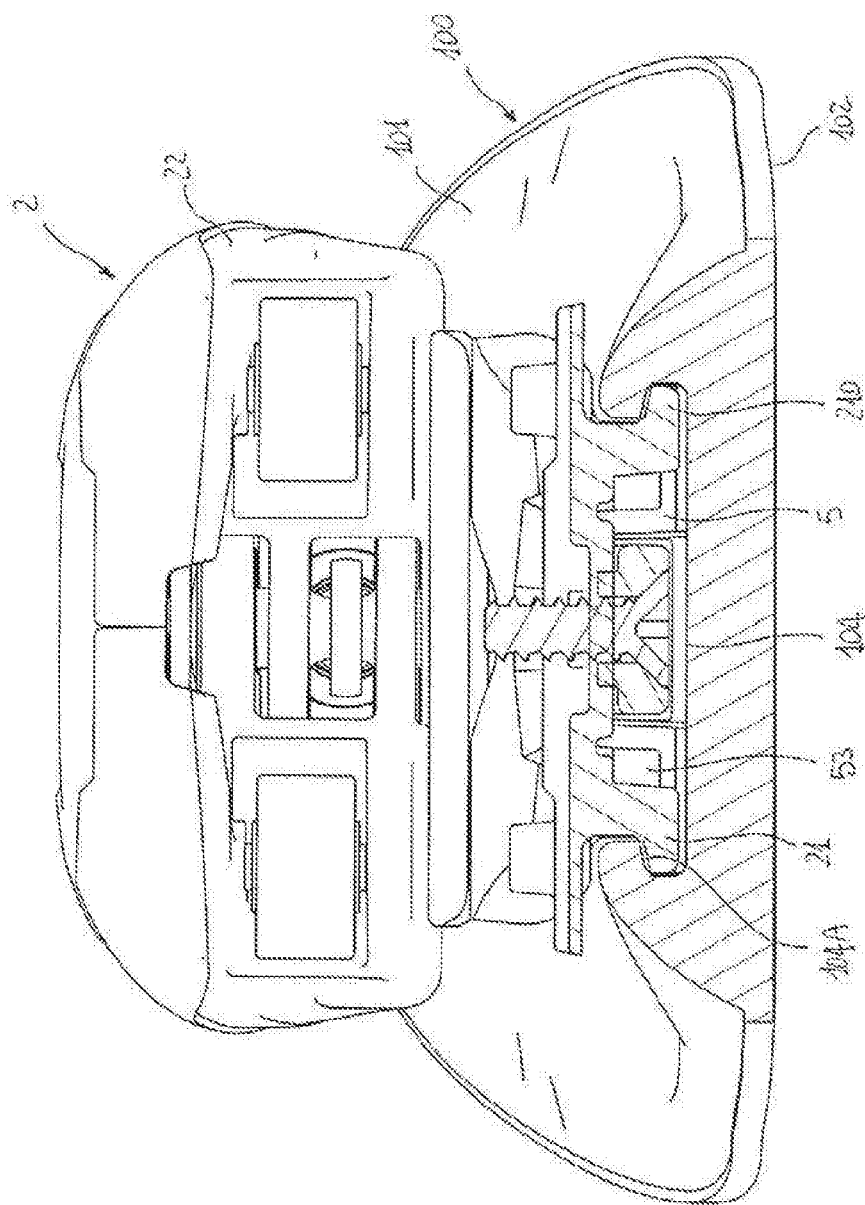


Fig. 15

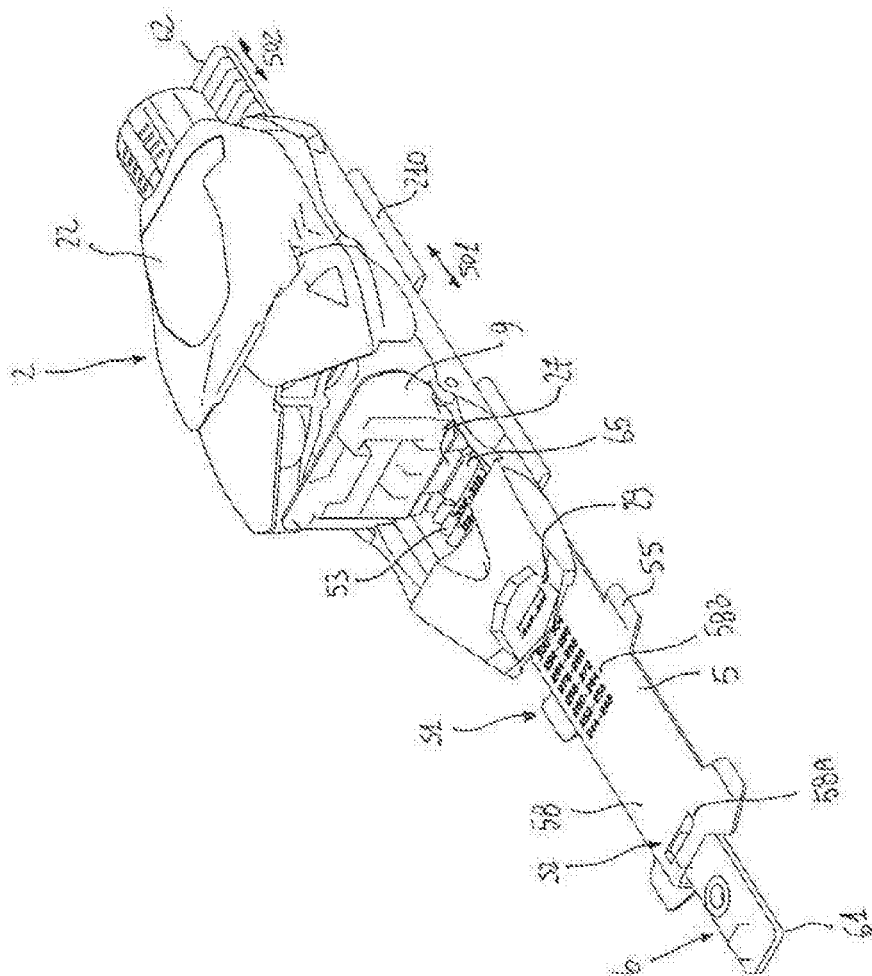
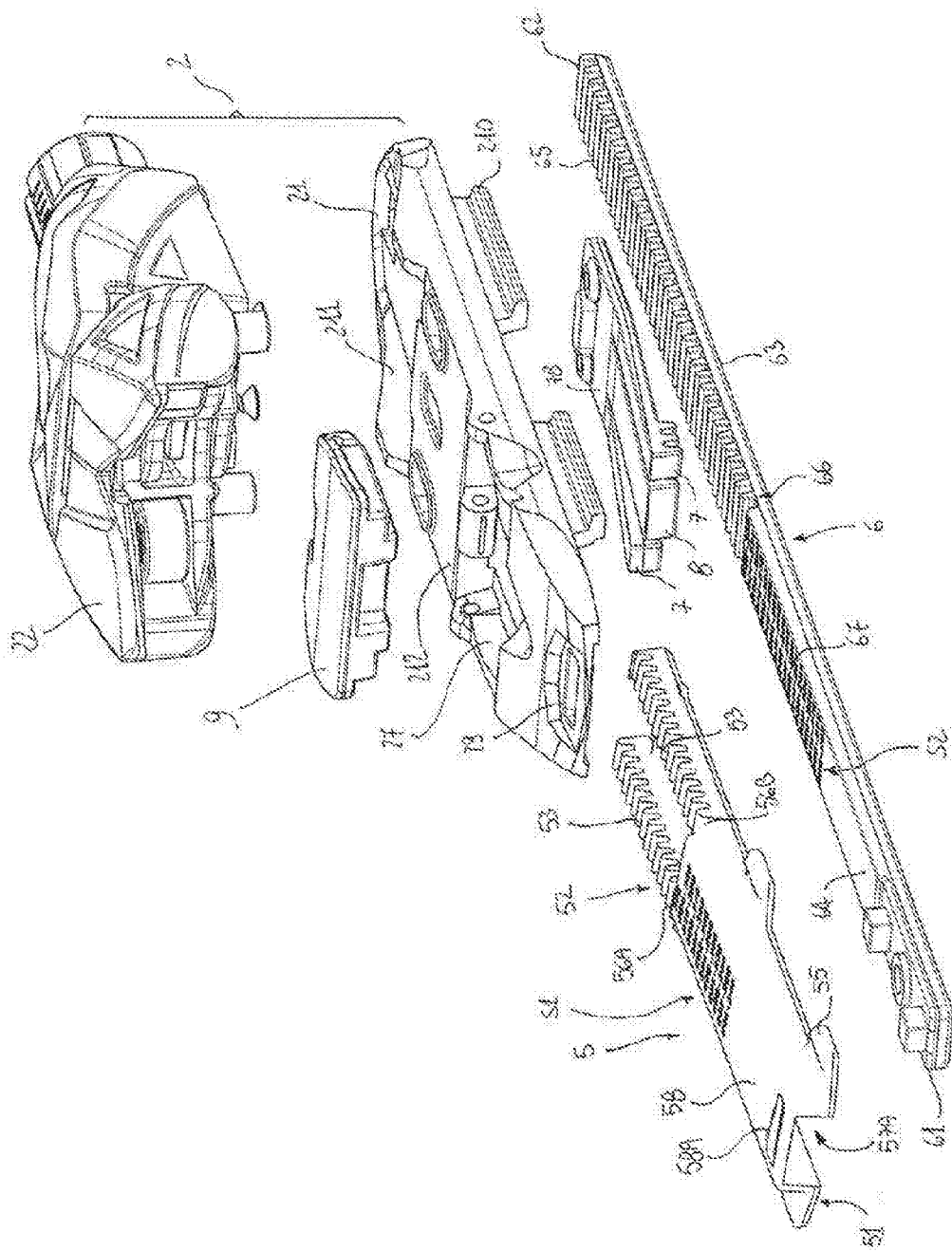


Fig. 46



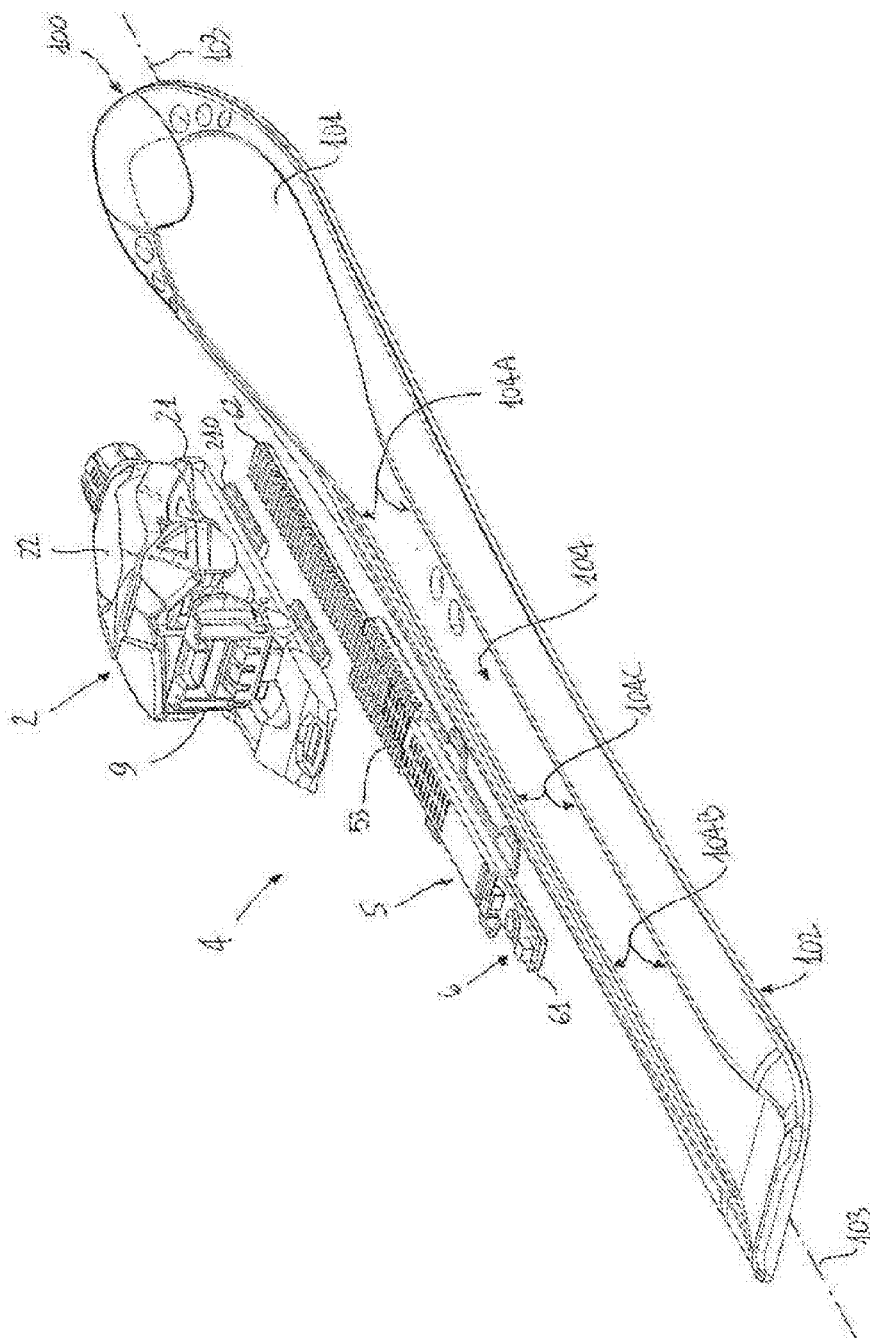


Fig. 18

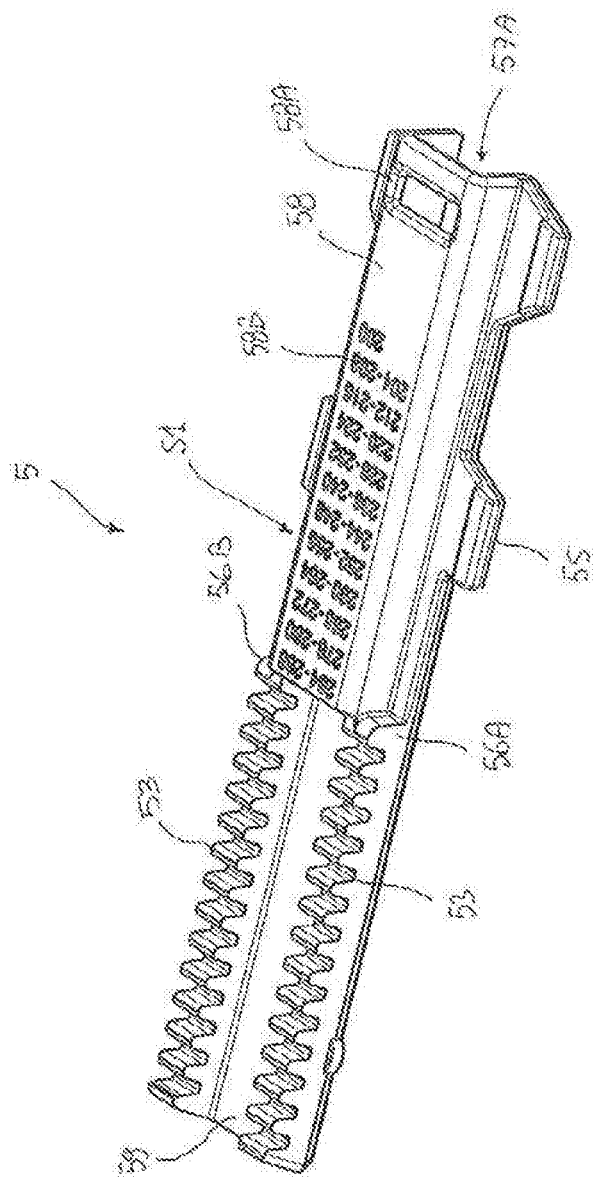


Fig. 49

SKI BINDING

[0001] The present invention relates to a ski binding having improved features.

[0002] Generally, a ski binding comprises a toe binding and a heel binding to connect the boot to the ski respectively at the toe and the heel of the user's foot.

[0003] It is also known that the position of the toe binding and/or of the heel binding must at times be varied to ensure optimal coupling of the boot to the ski. For example, this can occur in the case in which the user requires to change boot or to modify skiing mode for any reason.

[0004] In more conventional ski bindings, the toe binding and/or the heel binding of a ski are connected directly to the ski by means of fixing screws inserted into threaded holes made in the ski. Naturally, this solution causes structural weakening of the ski.

[0005] To avoid these drawbacks, the use of ski bindings provided with adjusting plates fixed to the ski and usable as connection support for the toe binding and the heel binding has become increasing widespread. In this way, the position of the toe binding and/or of the heel binding can be adjusted, while maintaining the structure of the ski substantially integral.

[0006] Some bindings of this latter type enable substantially continuous adjustment of the position of the toe binding and/or of the heel binding.

[0007] For example, the ski binding, described in the patent application EP729770, comprises a fixing plate provided with a rack for adjustment. The heel binding is provided with a reversible blocking and adjusting mechanism, actuatable by the user and comprising a tooth removably engageable with the rack.

[0008] In the ski binding described in the patent application DE2246668, a rack and pinion system enables simultaneous adjustment of the position of the toe binding and heel binding of the ski binding, slidably connected to a fixing plate solidly connected to the ski.

[0009] Similarly, in the ski binding described in the patent application WO2002/005909, a system of pulleys simultaneously moves two plates (connected respectively to the toe binding and heel binding) in relation to a base, solidly connected to the ski.

[0010] The patent U.S. Pat. No. 6,471,235 describes a ski binding comprising a toe binding and a heel binding capable of sliding freely along the ski.

[0011] The ski binding comprises a first blocking plate solidly connected with the ski, a second blocking plate solidly connected to the toe binding and a third blocking plate solidly connected to the heel binding. These blocking plates are superimposed one on another in a sandwich structure and are provided with toothed surfaces mutually coupleable in a selective manner. A blocking screw is used to couple the plates to one another and fix the position of toe binding and heel binding with respect to the ski.

[0012] Prior art ski bindings have relatively complex and bulky structures.

[0013] Moreover, operations to adjust them are somewhat laborious and often require the use of special equipment and/or the assistance of specialized personnel.

[0014] These drawbacks can make the ski binding difficult to use, especially for inexperienced users, and unavoidably lead to relatively high industrial costs and production times.

[0015] The main aim of the present invention is to provide a ski binding that allows the drawbacks of the prior art described above to be overcome.

[0016] Within this aim, an object of the present invention is to produce a ski binding that facilitates adjustment of the toe binding and heel binding position with respect to the ski.

[0017] A further object of the present invention is to produce a ski binding that is easily used by the user, even in adverse weather conditions.

[0018] One more object of the present invention is to produce a ski binding that has a structure that is sturdy and of limited size, relatively easy and inexpensive to assemble and to manufacture on an industrial scale.

[0019] This aim and these objects, together with other objects that will be more apparent from the subsequent description and from the accompanying drawings, are achieved, according to the invention, by a ski binding according to claim 1 and to the related dependent claims proposed hereunder.

[0020] In general definition, the ski binding, according to the invention, comprises a toe binding and a heel binding free to slide with respect to the ski at respective first and second sliding seats.

[0021] The ski binding, according to the invention, comprises a blocking and adjusting mechanism to fix the toe binding and heel binding position with respect to the ski.

[0022] This blocking and adjusting mechanism can be operated simply by means of an operation lever.

[0023] Adjustment of the toe binding and heel binding position can thus take place simply and directly, through easy manual operations.

[0024] The ski binding, according to the invention, has a structure of limited size, in particular according to a direction perpendicular to the upper surface of the ski.

[0025] The ski binding, according to the invention, also has a structure that is relatively simple to produce and assembly on an industrial scale.

[0026] Further characteristics and advantages of the ski binding, according to the present invention, will be better understood by referring to the description below and to the accompanying drawings, which are provided purely by way of non-limiting example, wherein:

[0027] FIGS. 1-9, 9A, 10-11 represent some schematic views of an embodiment of the ski binding, according to the present invention;

[0028] FIGS. 12-19 represent some schematic views of a further embodiment of the ski binding, according to the present invention.

[0029] With reference to the aforesaid figures, the present invention refers to a ski binding 1 configured to be mounted on a ski 100.

[0030] For the sake of clarity, it is specified that the ski binding 1 will be described in the following with reference to its operative mounting on the ski. The relative positioning and the orientation of the parts of the ski binding 1 will thus be described with reference to the case in which the ski binding 1 is mounted on the ski.

[0031] The ski 100 extends along a main longitudinal axis 103 and comprises a lower sliding surface 102 and an upper surface 101, opposite to the surface 102.

[0032] According to the invention, the ski binding 1 comprises a toe binding 2 and a heel binding 3 configured to be operatively connected to the ski at the upper surface 101.

[0033] In particular, the toe binding 2 and the heel binding 3 are slidably coupleable to the ski 100, preferably at first sliding seats 54, 104A and at second sliding seats 350, 104B, respectively.

[0034] According to the embodiment shown in FIGS. 1-9, 9A, 10-11, the ski binding 1 comprises the first and second sliding seats 54, 350 for the toe binding 2 and the heel binding 3, respectively.

[0035] In this case, these seats consist of shaped grooves (substantially parallel to the longitudinal axis 103) produced respectively in a blocking plate 5 and a support plate 35 of the ski binding, solidly connected with the ski.

[0036] According to the embodiment shown in FIGS. 12-19, the ski 100 comprises the first and second sliding seats 104A, 104B for the toe binding 2 and the heel binding 3, respectively.

[0037] In this case, the sliding seats 104A, 104B consist of shaped grooves (substantially parallel to the longitudinal axis 103) formed in the ski, at the upper surface 101.

[0038] The sliding seats 104A, 104B are preferably formed by the walls of a shaped recess 104 that extends along the ski, parallel to the longitudinal axis 103.

[0039] Preferably, the toe binding 2 comprises a first base 21 for coupling with the ski and a first upper portion 22 for coupling with user's boot.

[0040] The upper portion 22 (which can be of known type) is positioned superimposed on the base 21 (taking as reference the surface 101 of the ski) and is solidly connected to this latter with known connection means (such as screws).

[0041] The base 21 advantageously comprises a plurality of first coupling surfaces 211, 212 with the upper portion 22 of the toe binding.

[0042] According to the embodiment shown in FIGS. 1-9, 9A, 10-11, the base 21 of the toe binding is coupleable to the blocking plate 5 of the ski binding at the first sliding seats 54. The plate 5 can be, in turn, solidly connected with the ski 100 by means of known connection means (such as screws).

[0043] According to the embodiment shown in FIGS. 12-19, the base 21 of the toe binding is directly coupleable to the ski 100, at the first sliding seats 104A produced on the ski.

[0044] The base 21 of the toe binding is provided with first shaped guiding edges 210 slidably coupleable with the first sliding seats 54, 104A to allow the toe binding 2 to slide (reference 501) along the ski (i.e. along the longitudinal axis 103) simultaneously preventing all lateral (i.e. perpendicular to the axis 103 and parallel to the upper surface 101) or vertical (i.e. perpendicular to the axis 103 and to the upper surface 101) movement thereof.

[0045] The heel binding 3 comprises a second base 31 for coupling with the ski and a second upper portion 32 for coupling with user's boot.

[0046] The upper portion 32 (which can be of known type) is positioned superimposed on the base 31 and is solidly connected to this latter with connection means of known type (such as screws).

[0047] The base 31 of the heel binding advantageously comprises second coupling surfaces 311 with the upper portion 32.

[0048] According to the embodiment shown in FIGS. 1-9, 9A, 10-11, the base 31 of the heel binding is coupleable to the support plate 35 of the ski binding at the second sliding

seats 350. The support plate 35 can be, in turn, solidly connected with the ski 100 by connection means of known type (such as screws).

[0049] According to the embodiment shown in FIGS. 12-19, the base 31 of the heel binding is directly coupled to the ski 100, at the second sliding seats 104B produced on the ski.

[0050] The base 31 of the heel binding is provided with second shaped guiding edges 310 slidably coupleable with the second sliding seats 350, 104B to allow the heel binding 3 to slide (reference 502) along the ski, simultaneously preventing all lateral or vertical movement thereof.

[0051] According to the invention, the ski binding 1 comprises a blocking and adjusting mechanism 4, reversibly actuable by the user between a blocking position and a release position.

[0052] At the aforesaid blocking position of the mechanism 4, the toe binding 2 and the heel binding 3 are solidly connected to the ski 100 in a fixed position.

[0053] At the aforesaid release position of the mechanism 4, the toe binding 2 and the heel binding 3 are free to slide with respect to the ski 100 along the longitudinal axis 103 (references 501, 502).

[0054] According to the invention, the mechanism 4 comprises the blocking plate 5, solidly connectable to the ski 100.

[0055] The plate 5 can be solidly connected to the ski with connection means of known type (such as screws).

[0056] Preferably, the plate 5 comprises a first lower surface 51 oriented towards the upper surface 101 of the ski, when the ski binding is mounted on the ski, and a first upper surface 52, opposite to the first lower surface 51 and parallel the upper surface 101 of the ski, when the ski binding is mounted on the ski.

[0057] Preferably, the surface 51 is coupled with the upper surface 101 of the ski, when the ski binding is mounted on the ski.

[0058] The plate 5 is operatively coupled (in a sliding manner as mentioned above) to the toe binding 2, in particular to the first base 21 thereof, when the ski binding is mounted on the ski.

[0059] The base 21 of the toe binding 2 is at least partially superimposed on the plate 5, when the ski binding is mounted on the ski.

[0060] As mentioned above, according to the embodiment of the invention shown in FIGS. 1-9, 9A, 10-11, the plate 5 comprises the first sliding seats 54 of the toe binding 2.

[0061] In this case, the seats 54 are formed by lateral grooves 54 of the plate 5, operatively connectable (through positive fit) with the first guiding edges 210 of the base 21 of the toe binding 2.

[0062] According to the invention, the plate 5 comprises first blocking means 53.

[0063] Preferably, the blocking means 53 are positioned at the first upper surface 52.

[0064] The first blocking means are preferably formed by first blocking teeth 53.

[0065] Preferably, the blocking teeth 53 are positioned at the first upper surface 52 and are oriented in the opposite direction with respect to the upper surface 101 of the ski.

[0066] Preferably, the blocking teeth 53 are positioned transversally with respect to the ski, according to a direction

substantially perpendicular to the longitudinal axis **103** and parallel to the upper surface **101**, when the ski binding is mounted on the ski.

[0067] Preferably, the plate **5** is formed by a first and second portion **56A**, **56B** spaced from each other.

[0068] The portions **56A**, **56B** of the plate **5** are substantially symmetrical and extend along the ski **110**, according to directions parallel to the longitudinal axis **103**, when the ski binding is mounted on the ski.

[0069] According to the embodiment of the invention shown in FIGS. **1-9**, **9A**, **10-11**, the plate **5** comprises a transverse portion **57** that joins the portions **56A**, **56B** distally positioned with respect to the heel binding **3**, when the ski binding is mounted on the ski.

[0070] The portions **56A**, **56B** and **57** define a coupling seat **57A** of the plate **5** configured to house, at least partially, a blocking and adjusting rod **6** of the mechanism **4**.

[0071] The plate **5** is connectable to the ski **100** (in a fixed manner) at the longitudinal portions **56A**, **56B**.

[0072] According to the embodiment of the invention shown in FIGS. **12-19**, the plate **5** comprises a lower transverse wall **59** that joins the portions **56A**, **56B** distally positioned with respect to the heel binding **3**, when the ski binding is mounted on the ski.

[0073] The lower transverse wall **59** is superimposed on the upper wall **101** of the ski, when the ski binding is mounted on the ski.

[0074] Preferably, the plate **5** comprises an upper transverse wall **58** that joins the portions **56A**, **56B** proximally positioned with respect to the heel binding **3**, when the ski binding is mounted on the ski.

[0075] The upper transverse wall **58** is spaced from the upper surface **101** of the ski, when the ski binding is mounted on the ski.

[0076] The base **21** of the toe binding **2** is superimposed on the upper wall **58** of the plate **5**, when the ski binding is mounted on the ski.

[0077] The portions **56A**, **56B** and the walls **58**, **59** define the coupling seat **57A** of the plate **5** configured to house, at least partially, the rod **6** of the mechanism **4**.

[0078] The plate **5** comprises, at the upper wall **58**, a first numbered scale **58B** indicative of the operation position **S1** of the toe binding **2**, with respect to the ski.

[0079] The numbered scale **58B** can advantageously be inspected through a first window **29** of the base **21** of the toe binding **2**.

[0080] The plate **5** also comprises, at the upper wall **58**, a second window **58A**, at which it is possible to inspect a second numbered scale **67** present on the rod **6**.

[0081] The plate **5** is connectable (in a fixed manner) to the ski **100** at the lower transverse wall **59**.

[0082] The plate **5** also comprises third fastening edges **55** that protrude laterally from the portions **56A**, **56B** of the plate **5**.

[0083] The fastening edges **55** are advantageously shaped so as to be coupleable with third fastening seats **104C** consisting of shaped grooves (substantially parallel to the longitudinal axis **103**) of the ski **100**, at the upper surface **101**.

[0084] Preferably, also the fastening seats **104C** are formed by the walls of the shaped recess **104** that extends along the ski **100** at the upper surface **101**.

[0085] Referring again to both the embodiments of the invention shown in the cited figures, the first blocking teeth

53 of the plate **5** are preferably positioned at the longitudinal portions **56A**, **56B** of this latter.

[0086] Preferably, the blocking teeth **53** are arranged in parallel rows that extend along the portions **56A**, **56B** according to directions parallel to the longitudinal axis **103**.

[0087] Each row comprises a number of consecutive blocking teeth **53** arranged along a direction substantially perpendicular to the longitudinal axis **103** and parallel to the upper surface **101**, when the ski binding is mounted on the ski.

[0088] Preferably, each of the longitudinal portions **56A**, **56B** comprises a same number **P** of blocking teeth **53**.

[0089] According to the embodiment of the invention shown in FIGS. **1-9**, **9A**, **10-11**, the blocking teeth **53** are proximally positioned with respect to the heel binding **3**, when the ski binding is mounted on the ski.

[0090] According to the embodiment of the invention shown in FIGS. **12-19**, the blocking teeth **53** are distally positioned with respect to the heel binding **3**, when the ski binding is mounted on the ski.

[0091] According to the invention, the mechanism **4** comprises the blocking and adjusting rod **6**.

[0092] The rod **6** comprises a first and second end **61**, **62** opposite each other.

[0093] At the first end **61**, the rod **6** is solidly connected to the heel binding **3**, in particular to the base **31** thereof, by fixing means of known type (such as screws).

[0094] In this way, the rod **6** is free to slide (reference **502**) along the ski **100** (i.e. along the longitudinal axis **103**) together with the heel binding **3**, when the mechanism **4** is in release position.

[0095] The rod **6** comprises a third portion **66** distally positioned with respect to said first end **61**.

[0096] Preferably, the third portion **66** of the rod **6** comprises the second end **62** thereof.

[0097] At the third portion **66**, the rod **6** is slidably coupled to the plate **5**.

[0098] In particular, the third portion **66** of the rod **6** is advantageously housed, at least partially, in the coupling seat **57A** of the plate **5**.

[0099] Inside the coupling seat **57A**, the rod **6** is free to slide along the longitudinal axis **103** when the mechanism **4** is in release position.

[0100] Coupling with the seat **57A** of the plate **5** prevents all transverse movement of the rod **6** during movement of this latter along the ski (reference **502**).

[0101] The rod **6** is operatively associated to the toe binding **2**, at the third portion **66**.

[0102] When the ski binding is mounted on the ski, the base **21** of the toe binding **2** is at least partially superimposed on the rod **6** at the portion **66**.

[0103] The base **21** of the toe binding **2** defines, in cooperation with the ski **100** and the plate **5**, a volume inside which the rod **6**, in particular the portion **66** thereof, is free to slide with respect to the ski, when the mechanism **4** is in release position.

[0104] It is important to note that the rod **6** and the toe binding **2** are free to move with respect to the ski **100** and with respect to each other, when the mechanism **4** is in release position.

[0105] Preferably, the rod **6** comprises a second lower surface **63** oriented towards the upper surface **101** of the ski, when the ski binding is mounted on the ski, and a second upper surface **64**, opposite to the second lower surface **63**

and parallel the upper surface **101** of the ski, when the ski binding is mounted on the ski.

[0106] Advantageously, the second upper surface **64** of rod **6** and the first upper surface **52** of the blocking plate **5** are co-planar along a same reference plane parallel to the upper surface **101** of the ski.

[0107] According to the invention, the rod **6** comprises second blocking means **65** distally positioned from the first end **61** and proximally positioned to the second end **62**.

[0108] Preferably, the blocking means **65** are positioned at the third portion **66** of the rod **6**. Advantageously, the blocking means **65** are positioned at the second upper surface **64** of the rod **6**.

[0109] The first and second blocking means **53**, **65** are thus arranged on surfaces **52**, **64** of the blocking plate **5** and of the blocking and adjusting rod **6**, which are substantially parallel to the upper surface **101** of the ski, when the ski binding is arranged on the ski.

[0110] Preferably, the first and second blocking means **53**, **65** are arranged on substantially co-planar surfaces **52**, **64** of the blocking plate **5** and of the blocking and adjusting rod **6**, which are arranged along a same reference plane parallel to the upper surface **101** of the ski, when the ski binding is arranged on the ski.

[0111] Preferably, the aforesaid second blocking means are formed by second blocking teeth **65**.

[0112] Preferably, the blocking teeth **65** are positioned at the second upper surface **64** of the rod **6** and are oriented in the opposite direction to the upper surface **101** of the ski.

[0113] Preferably, the blocking teeth **65** are positioned transversally with respect to the ski, according to a direction substantially perpendicular to the longitudinal axis **103** and parallel to the upper surface **101**, when the ski binding is mounted on the ski.

[0114] Preferably, the blocking teeth **53** of the plate **5** and the blocking teeth **65** of the rod **6** are arranged along a same plane parallel to the upper surface **101** of the ski, when the ski binding is mounted on the ski.

[0115] Preferably, the rod **6** comprises a row of second blocking teeth **65** that extends according to a direction parallel to the longitudinal axis **103**, between the parallel rows of the blocking teeth **53** of the portions **56A**, **56B** of the plate **5**, when the ski binding is mounted on the ski.

[0116] Such a row comprises a number of consecutive blocking teeth **65** arranged along a direction substantially perpendicular to the longitudinal axis **103** and parallel to the upper surface **101**, when the ski binding is mounted on the ski.

[0117] The second blocking teeth **65** can therefore be in different positions of alignment **51** with the first blocking teeth **53**, according to directions substantially perpendicular to the longitudinal axis **103** and parallel to the upper surface **101**.

[0118] Each of these positions of alignment can be selected by sliding the blocking and adjusting rod **6** along the ski, in particular by sliding the third portion **66** of the rod **6** along the coupling seat **57A** of the plate **5**.

[0119] Given that the rod **6** is solidly connected with the heel binding **3**, each of the positions of alignment corresponds to an operation position **S2** of the heel binding **3** with respect to the ski and can be selected by moving the heel binding **3** along the second sliding seats **350**, **104B**.

[0120] Given that the rod **6** and the toe binding **2** can move with respect to each other, each operation position **S2** of the

heel binding **3** can be selected independently from the operation position **51** taken by the toe binding **2**.

[0121] Preferably, the rod **6** comprises, at the second upper wall **64**, a second numbered scale **67** indicative of the operation position **S2** of the heel binding **3**, with respect to the ski.

[0122] According to the invention, the mechanism **4** comprises one or more blocking wings **7**, **8**.

[0123] Each of the blocking wings **7**, **8** comprises a third free end **71**, **81**, oriented towards the heel binding **3** (when the ski binding is mounted on the ski), and a fourth constrained end **72**, **82**, opposite to the aforesaid third free end and solidly connected to the toe binding **2**, preferably to the coupling portion **22** of this latter.

[0124] The blocking wings **7**, **8** can be fixed independently to the toe binding **2**, at the related constrained end **72**, **82**.

[0125] Preferably, each of the blocking wings **7**, **8** is solidly connected to a common connection plate **78**, at the related constrained end **72**, **82**, so as to form one piece with this latter. In turn, the plate **78** is solidly connected with the toe binding **2** by connection means of known type (such as screws).

[0126] Preferably, the blocking wings **7**, **8** are arranged side by side with one another and extend along directions parallel to the longitudinal axis **103**, when the ski binding is mounted on the ski.

[0127] The blocking wings **7**, **8** are elastically deformable by bending.

[0128] The definition “elastically deformable by bending” means that, during normal operation of the ski binding, each of the blocking wings **7**, **8** is capable of returning to its original shape and volume at rest, after having been subjected to mechanical deformation (bending) in response to a bending moment applied.

[0129] In practice, each of the blocking wings **7**, **8** behaves like a pinned-free beam having a point of constraint at the fourth end **72**, **82** and capable of elastic deformation in response to the application of a bending moment.

[0130] Preferably, the blocking wings **7**, **8** are shaped so as to be elastically deformable by bending in response to the application of a bending moment **F** directed towards the ski **100**, when the ski binding is mounted on the ski.

[0131] The blocking wings **7**, **8** are shaped so that, in a condition at rest, the third free end **71**, **81** is at a greater distance from the ski with respect to the fourth constrained end **72**, **83**, when the ski binding is mounted on the ski.

[0132] According to the invention, the blocking wings **7**, **8** comprise (preferably proximally positioned to the third free end **71**, **81**) third blocking means **75**, **85** reversibly coupleable with the first and second blocking means **53**, **65**.

[0133] Preferably, the third blocking means **75**, **85** are positioned at the third free end **71**, **81**.

[0134] Preferably, the aforesaid blocking wings comprise at least a first blocking wing **8** that comprises a third lower surface **83**, configured to be oriented towards the upper surface **101** of the ski, when the ski binding is mounted on the ski, and a third upper surface **84**, opposite to the lower surface **83**.

[0135] Preferably, the third lower surface **83** is oriented towards the second upper surface **64** of the rod **6**, when the ski binding is mounted on the ski.

[0136] Preferably, the first blocking wing **8** comprises third blocking means formed by third blocking teeth **85**.

[0137] Preferably, the teeth **85** are positioned at the third lower surface **83**.

[0138] Preferably, the teeth **85** are oriented towards the upper surface **101** of the ski and are positioned transversally with respect to the ski, when the ski binding is mounted on the ski.

[0139] The teeth **85** are arranged on the surface **83** so as to extend along a direction substantially perpendicular to the longitudinal axis **103**, when the ski binding is mounted on the ski.

[0140] The third blocking means of the blocking wing **8** are adapted to interact with second blocking means **63** of the rod **6**.

[0141] Preferably, the second blocking teeth **65** and the third blocking teeth **85** are selectively mutually coupleable, at different coupling positions.

[0142] Each of these coupling positions can be selected by sliding the rod **6** and the toe binding **2** along the ski.

[0143] Given that the rod **6** is solidly connected with the heel binding **3**, each of these coupling positions corresponds to:

[0144] an operation position **S2** of the heel binding **3** with respect to the ski, selectable by moving the heel binding **3** (reference **502**) along the second sliding seats **350**, **104B**; and

[0145] an operation position **S1** of the toe binding **2** with respect to the ski, selectable by moving the toe binding **2** along the first sliding seats **54**, **104A**.

[0146] Preferably, the aforesaid blocking wings comprise one or more second blocking wings **7**.

[0147] Preferably, the second blocking wings **7** each comprise a fourth lower surface **73** configured to be oriented towards the upper surface **101** of the ski, when the ski binding is mounted on the ski, and a fourth upper surface **74**, opposite to the fourth lower surface **73**. Preferably, the fourth lower surface **74** is oriented towards the first upper surface **52** of the plate **5**.

[0148] Preferably, the second blocking wings **7** comprise third blocking means formed by fourth blocking teeth **75**.

[0149] Preferably, the teeth **75** are positioned at the fourth lower surface **73**.

[0150] Preferably, the teeth **75** are oriented towards the upper surface **101** of the ski and are positioned transversally with respect to the ski, when the ski binding is mounted on the ski.

[0151] The teeth **75** are arranged on the surface **73** so as to extend along a direction substantially perpendicular to the longitudinal axis **103**, when the ski binding is mounted on the ski.

[0152] The third blocking means of the blocking wings **7** are adapted to interact with first blocking means **53** of the blocking plate **5**.

[0153] Preferably, the first blocking teeth **53** and the fourth blocking teeth **75** are selectively mutually coupleable, in different coupling positions.

[0154] Each of these coupling positions can be selected by sliding the toe binding **2** along the ski.

[0155] Each of these coupling positions corresponds to an operation position **S1** of the toe binding **2** with respect to the ski, selectable by moving the toe binding **2** (reference **501**) along the first sliding seats **54**, **104A**.

[0156] Preferably, the aforesaid blocking wings comprise a single first blocking wing **8** and a pair of second blocking

wings **7** arranged side by side and mutually parallel, with the first blocking wing **8** positioned between the blocking wings **7**.

[0157] Advantageously, the first blocking wing **8** is superimposed on the rod **6** (in particular on the third portion **66** of this latter) while each of the blocking wings **7** is superimposed on a corresponding portion **56A**, **56B** of the plate **5**, when the ski binding is mounted on the ski.

[0158] In principle, as mentioned above, the number of the first, second, third and fourth blocking teeth **53**, **65**, **85**, **75** can be any according to requirements.

[0159] Preferably, the blocking teeth **53**, **65**, **85**, **75** are prearranged so that the following relations are valid: $N > X1$, $P > X2$, $X1 = X2$, where N is the number of teeth **65** of the rod **6**, P is the number of teeth **53** of each of the portions **56A**, **56B** of the plate **5**, $X1$ is the number of teeth **85** of the first blocking wing **8** and $X2$ is the number of teeth **75** of each of the second blocking wings **7**.

[0160] From the above it is evident that, when the mechanism **4** is in blocking position:

[0161] all the teeth **75**, **85** of the blocking wings **7**, **8** engage and mesh with the teeth **53**, **65** of the plate **5** and of the rod **6**;

[0162] some ($X1$) teeth of the rod **6** engage and mesh with the teeth **85** of the first blocking wing **8**,

[0163] other ($N - X1$) blocking teeth **65** of the rod **6** remain free;

[0164] only some ($X2$) teeth **53** of each of the portions **56A**, **56B** of the plate **5** engage and mesh with the teeth **75** of each of the second blocking wings **7**;

[0165] other ($P - X2$) blocking teeth **53** of each of the portions **56A**, **56B** remain free.

[0166] According to the invention, the mechanism **4** comprises an operation lever **9** solidly connected to the toe binding **2**.

[0167] The operation lever **9** moves solidly with the toe binding **2**, when this latter slides along the ski **100** (reference **501**).

[0168] Preferably, the operation lever **9** is free to rotate with respect to the toe binding **2**, according to an axis of rotation **92** perpendicular to the longitudinal axis **103** and parallel to the upper surface **101** of the ski, when the ski binding is mounted on the ski.

[0169] Preferably, the lever **9** is rotationally connected to the base **21** of the toe binding **2** by means of a connecting pin, arranged along the aforesaid axis of rotation **92**.

[0170] The lever **9** comprises an actuation surface **91** reversibly coupleable to the blocking wings **7**, **8**.

[0171] Preferably, the actuation surface **91** is coupleable with the upper surface **74**, **84** of the blocking wings **7**, **8**.

[0172] Preferably, the lever **9** is located in superimposed position with respect to the blocking wings **7**, **8**, when the ski binding is mounted on the ski.

[0173] The lever **9** is reversibly movable in a first operation position **A** (for example during adjusting of the ski binding), at which the actuation surface **91** is decoupled from the blocking wings **7**, **8** (FIG. **10**), and in a second operation position **B** (for example during use of the ski), at which the actuation surface **91** is coupled with all the blocking wings **7**, **8** (FIG. **11**).

[0174] Preferably, the lever **9** comprises a shaped box-like body having a lower surface that forms the actuation surface **91**, a front surface **93**, a rear surface **95** and an upper surface **94**.

[0175] Preferably, the actuation surface 91 is at a greater distance from the axis of rotation 92 with respect to the front surface 93.

[0176] In this way, the lever 9 forms a cam actuation element (having a cam-shaped surface formed by the surfaces 91 and 93 described above), which is capable of transforming its rotational movement around the axis 92 in a translational movement of the blocking wings 7, 8.

[0177] Preferably, when the lever 9 is in the operation position A (with the ski binding mounted on the ski):

[0178] the front surface 93 is oriented towards the upper surface 101 of the ski but is not in contact with the blocking wings 7, 8;

[0179] the upper surface 94 is instead oriented towards the toe binding 2;

[0180] the actuation surface 91 is oriented towards the heel binding 3;

[0181] the rear surface 95 is oriented in the opposite direction with respect to the upper surface 101 of the ski.

[0182] Preferably, when the lever 9 is in the release operation position B (with the ski binding mounted on the ski):

[0183] the actuation surface 91 is oriented towards the upper surface 101 of the ski and is in contact with the blocking wings 7, 8, at the surfaces 74, 84 of these latter;

[0184] the front surface 93 is oriented towards the toe binding 2;

[0185] the rear surface 95 is oriented towards the heel binding 3;

[0186] the upper surface 94 is oriented towards the heel binding 3.

[0187] According to an alternative embodiment of the present invention, the operation lever 9 is reversibly movable in a third operation position (not shown), which is intermediate between the operation positions A, B described above.

[0188] Said third operation position of the operation lever 9 corresponds to a partial blocking position of the blocking and adjusting mechanism 4, in which the actuation surface 91 is coupled only with at least one of the second blocking wings 7 and is not coupled with the first blocking wings 8 (and possibly with the remaining non-actuated blocking wings 7).

[0189] In this way, the blocking means 75 of the actuated blocking wing 7 engage with the corresponding blocking means 53 of the blocking plate 5 whereas the blocking means 85 of the blocking wings 8 remain disengaged from the corresponding blocking means 65 (and possibly the blocking means 75 of the remaining non-actuated blocking wings 7 remain disengaged from the corresponding blocking means 53 of the plate 5).

[0190] According to this embodiment of the invention, the actuation surface 91 is shaped so as to have at least a protrusion at the at least one blocking wing 7 to be actuated with the lever 9 in said third operation position.

[0191] In this way, when the lever 9 is in said third operation position (with the ski binding mounted on the ski), the actuation surface 91 is oriented along a plane forming an angle (e.g. 45°) with the upper surface 101 of the ski and the protrusion of the actuation surface 91 pushes the corresponding actuated wing 7 towards the blocking plate 5, so that the blocking teeth 75 of the actuated wing 7 couple with the corresponding blocking teeth 53 of the blocking plate 5.

[0192] Preferably, the lever 9 is housed in a housing 27 of the base 21 of the toe binding 2. This enables improved structural integration between parts and a further reduction of the vertical dimensions of the ski binding.

[0193] Preferably, the actuation surface 91 and the front surface 93 are substantially flat.

[0194] Preferably, the actuation surface 91 and the front surface 93 are generally arranged along intersecting planes forming an angle α .

[0195] Preferably, the angle α ranges from 83° to 89° (more preferably $\alpha=86^\circ$).

[0196] This solution is advantageous as it allows the lever 9 to stably maintain the operation position A, during adjusting of the ski binding.

[0197] Moreover, the lever 9 is also capable of stably maintaining the operation position B during use of the ski, given that the user's boot is superimposed on the upper surface 95, when coupled to the ski binding.

[0198] According to the embodiment of the invention shown in FIGS. 1-9, 9A, 10-11, the ski binding 1 comprises a protection element 150 of the rod 6.

[0199] The protection element 150 can be solidly connected with the plate 5 and the support plate 35, in turn solidly connectable to the ski 100.

[0200] The protection element 150 is shaped so as to form a shell configured to protect the rod 6 superiorly and laterally.

[0201] The protection element 150 comprises an upper wall 151 and, at this latter, a first numbered scale 153 indicative of the operation position S1 of the toe binding 2, with respect to the ski.

[0202] The first numbered scale 153 is advantageously inspectable through a first window 29 of the base 21 of the toe binding 2.

[0203] The protection element 150 comprises a second window 152 at which it is possible to inspect a second numbered scale 67 (indicative of the operation position S2 of the heel binding 3) present on the rod 6.

[0204] Operation of the mechanism 4 of the ski binding 1 will now be described in further detail with particular reference to the embodiments shown in cited figures.

[0205] To adjust the position of the toe binding 2 and of the heel binding 3 with respect to the ski, the user can manually actuate the lever 9 taking it to the operation position A corresponding to a release position of the mechanism 4 (FIG. 10).

[0206] With the lever 9 in the operation position A, the third blocking means 75, 85 are decoupled from the first and second blocking means 53, 65.

[0207] The lever 9 does not exert any force on the blocking wings 7, 8 which are thus in a position at rest, at which the teeth 75, 85 of the blocking wings 7, 8 are decoupled from the teeth 53, 65 of the plate 5 and of the rod 6.

[0208] With the lever 9 in the operation position A, it is therefore possible to adjust the position of the toe binding 2 and of the heel binding 3 with respect to the ski (independently), by sliding these latter along the respective sliding seats (references 501, 502).

[0209] During adjusting of the ski binding, the user can advantageously inspect (through the inspection windows 29 or 58A, 152), the numbered scales 58B, 153 or 67, respectively indicative of the operation positions S1 and S2 of the toe binding 2 and of the heel binding 3.

[0210] Preferably, the number S1 of operation positions available for the toe binding 2 is given by the relation $S1=P-1$, where P is the number of teeth 53 of each of the portions 56A, 56B of the plate 5.

[0211] Preferably, the number S2 of operation positions available for the heel binding 3 is given by the relation $S2=N-1$, where N is the number of teeth 65 of the rod 6.

[0212] After selecting the operation position desired for the toe binding 2 and the heel binding 3, the user can manually actuate the operation lever 9 taking it to the operation position B that advantageously corresponds to a blocking position of the blocking and adjusting mechanism 4 (FIG. 11).

[0213] In this operation position of the lever 9, the third blocking means 75, 85 are engaged with first and second blocking means 53, 65.

[0214] The lever 9 exerts on the blocking wings 7, 8 a force F (bending moment) directed towards the upper surface 101 of the ski.

[0215] The blocking wings 7, 8 are forced into a bending position, at which the blocking teeth 75, 85 of the blocking wings 7, 8 are engaged and mesh with the blocking teeth 53, 65 of the plate 5 and of the rod 6.

[0216] In particular, all the teeth 75, 85 of the blocking wings 7, 8 engage and mesh with some teeth 53, 65 of the plate 5 and of the rod 6 while other teeth 53, 65 of the plate 5 and of the rod 6 remain free.

[0217] The blocking mechanism 4 prevents all longitudinal movement of the toe binding 2 and of the heel binding 3 with respect to the ski.

[0218] The position of the toe binding 2 and of the heel binding 3 with respect to the ski is thus fixed.

[0219] The operation position B of the actuation lever 9 can be safely maintained during the use of the ski as the ski-boot of the user is superimposed to said lever when the ski binding is coupled to the ski-boot.

[0220] According to the alternative embodiment of the present invention described above (not shown), when it is moved in the intermediate third operation position, the lever 9 exerts a force F (bending moment) directed towards the upper surface 101 of the ski only on at least one blocking wing 7 to be actuated with the operation lever 9 in said third operation position.

[0221] The blocking wings 8 (and possibly the remaining non-actuated blocking wings 7) are not yet subject to any force.

[0222] The actuated blocking wing 7 is forced into a bending position, at which the corresponding blocking teeth 75 are engaged and mesh with the corresponding blocking teeth 53 of the plate 5.

[0223] The teeth 85 of the blocking wings 8 (and possibly the teeth 75 of the remaining non-actuated blocking wings 7) are instead still disengaged from the corresponding blocking teeth 65 of the rod 6 (and possibly from the corresponding blocking teeth 53 of the plate 5).

[0224] In this way, the blocking mechanism 4 prevents the longitudinal movement of the toe binding 2 only. Instead, the heel binding 3 can still be freely moved with respect to the ski.

[0225] It has been seen in practice that the ski binding 1 according to the invention solves the problems of the prior art and offers numerous advantages with respect thereto.

[0226] The blocking and adjusting mechanism 4 of the ski binding 1 is easily actuable by the user.

[0227] When it is in release position, it allows the user to easily adjust the position of toe binding and heel binding, without requiring special equipment and/or the assistance of specialized personnel, even in adverse weather conditions.

[0228] When it is in blocking position, it ensures an effective action to retain toe binding and heel binding in the desired operation position.

[0229] The ski binding 1 has a particularly simple and sturdy structure, easily able to withstand the normal mechanical stresses deriving from sporting activity.

[0230] The ski binding 1 is relatively simple to produce on an industrial scale and at limited costs.

1. Ski binding comprising:

- a toe binding and a heel binding configured to be operatively connected to a ski at an upper surface of said ski;
- a blocking and adjusting mechanism reversibly actuatable by the user between a blocking position, at which said toe binding and said heel binding are solidly connected with said ski in a fixed position, and a release position, at which said toe binding and said heel binding are free to slide with respect to said ski;

wherein said blocking and adjusting mechanism comprises:

- a blocking plate solidly connectable with said ski and comprising first blocking means;
- a blocking and adjusting rod having opposite first and second ends, said blocking and adjusting rod being solidly connected with said heel binding at said first end and being slidably coupled to said blocking plate at a third portion distally positioned with respect to said first end, said blocking and adjusting rod comprising second blocking means at said third portion,

wherein said first and second blocking means are arranged on surfaces of said blocking plate and of said blocking and adjusting rod, which are substantially parallel to the upper surface of said ski, when said ski binding is arranged on said ski;

- one or more blocking wings elastically deformable by bending, said blocking wings comprising a third free end and a fourth constrained end, opposite to said third end and solidly connected to said toe binding, said blocking wings comprising third blocking means that are reversibly coupleable with said first and second blocking means;

an operation lever solidly connected to said toe binding and comprising an actuation surface coupleable with said blocking wings, said operation lever being reversibly movable between:

- a first operation position corresponding to a release position of said blocking and adjusting mechanism, in which said actuation surface is decoupled from said blocking wings and said third blocking means are decoupled from said first and second blocking means; and
- a second operation position, corresponding to a blocking position of said blocking and adjusting mechanism, in which said actuation surface is coupled with said blocking wings and said third blocking means are engaged with said first and second blocking means.

2. Ski binding, according to claim 1, wherein said first and second blocking means are arranged on substantially coplanar surfaces of said blocking plate and of said blocking and adjusting rod, which are arranged along a same reference plane parallel to the upper surface of said ski, when said ski binding is arranged on said ski.

3. Ski binding, according to claim 1 wherein, said blocking plate comprises a first lower surface configured to be oriented towards the upper surface of said ski and a first upper surface, opposite to said first lower surface, said first blocking means comprising first blocking teeth at said first upper surface, said first blocking teeth being oriented away from the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

4. Ski binding, according to claim 1, wherein said blocking and adjusting rod comprises a second lower surface configured to be oriented towards the upper surface of said ski and a second upper surface, opposite to said second lower surface, said second blocking means comprising second blocking teeth at said second upper surface, said second blocking teeth being oriented away from the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

5. Ski binding, according claim 1, wherein said blocking wings comprise one or more first blocking wings comprising a third lower surface configured to be oriented towards the upper surface of said ski and a third upper surface, opposite to said third lower surface and coupleable with the actuation surface of said operation lever, said third blocking means comprising third blocking teeth at said third lower surface, said third blocking teeth being oriented towards the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

6. Ski binding, according to claim 1, wherein said blocking wings comprise one or more second blocking wings comprising a fourth lower surface configured to be oriented towards the upper surface of said ski and a fourth upper surface, opposite to said fourth lower surface and coupleable with the actuation surface of said operation lever, said third blocking means comprising fourth blocking teeth at said fourth lower surface, said fourth blocking teeth being oriented towards the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

7. Ski binding, according to claim 3, wherein said first blocking teeth and said fourth blocking teeth are selectively engageable and in that said second blocking teeth and said third blocking teeth are selectively engageable.

8. Ski binding, according to one or more of the previous claims, claim 1, wherein said toe binding and said heel binding are slidably coupleable to said ski at first sliding seats and second sliding seats, respectively.

9. Ski binding, according to claim 8, wherein it comprises said first and second sliding seats, at said blocking plate and at a support plate of said heel binding, respectively.

10. Ski binding, according to claim 8, wherein said ski comprises said first and second sliding seats, at the upper surface of said ski.

11. Ski binding, according to one or more of the previous claims, claim 1, wherein said actuation lever comprises a shaped box-like body having a lower surface that forms said actuation surface and a front surface, said lower surface and said front surface being arranged along intersecting planes forming an angle (α), said lower surface being at a greater distance from an axis of rotation of said operation lever with respect to said front surface.

12. Ski binding, according to claim 11, wherein said lower surface and said front surface are arranged along intersecting planes forming an angle (α) ranging from 83° to 89°.

13. Ski binding, according to claim 5, wherein said blocking wings comprise one or more second blocking wings comprising a fourth lower surface configured to be oriented towards the upper surface of said ski and a fourth upper surface, opposite to said fourth lower surface and coupleable with the actuation surface of said operation lever, said third blocking means comprising fourth blocking teeth at said fourth lower surface, said fourth blocking teeth being oriented towards the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski; and wherein said operation lever is reversibly movable in a third operation position, which is intermediate between said first and second operation positions (A, B), said third operation position corresponding to a partial blocking position of said blocking and adjusting mechanism, in which said actuation surface is coupled with at least one of said second blocking wings and is decoupled from said first blocking wings.

14. Ski binding, according to claim 2 wherein said blocking plate comprises a first lower surface configured to be oriented towards the upper surface of said ski and a first upper surface, opposite to said first lower surface, said first blocking means comprising first blocking teeth at said first upper surface, said first blocking teeth being oriented away from the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

15. Ski binding, according to claim 2, wherein said blocking and adjusting rod comprises a second lower surface configured to be oriented towards the upper surface of said ski and a second upper surface, opposite to said second lower surface, said second blocking means comprising second blocking teeth at said second upper surface, said second blocking teeth being oriented away from the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

16. Ski binding, according to claim 3, wherein said blocking and adjusting rod comprises a second lower surface configured to be oriented towards the upper surface of said ski and a second upper surface, opposite to said second lower surface, said second blocking means comprising second blocking teeth at said second upper surface, said second blocking teeth being oriented away from the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

17. Ski binding, according to claim 2, wherein said blocking wings comprise one or more first blocking wings comprising a third lower surface configured to be oriented towards the upper surface of said ski and a third upper surface, opposite to said third lower surface and coupleable with the actuation surface of said operation lever, said third blocking means comprising third blocking teeth at said third lower surface, said third blocking teeth being oriented towards the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

18. Ski binding, according to claim 3, wherein said blocking wings comprise one or more first blocking wings comprising a third lower surface configured to be oriented towards the upper surface of said ski and a third upper surface, opposite to said third lower surface and coupleable

with the actuation surface of said operation lever, said third blocking means comprising third blocking teeth at said third lower surface, said third blocking teeth being oriented towards the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

19. Ski binding, according to claim 4, wherein said blocking wings comprise one or more first blocking wings comprising a third lower surface configured to be oriented towards the upper surface of said ski and a third upper surface, opposite to said third lower surface and coupleable with the actuation surface of said operation lever, said third blocking means comprising third blocking teeth at said third lower surface, said third blocking teeth being oriented towards the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

20. Ski binding, according to claim 2 wherein said blocking wings comprise one or more second blocking wings comprising a fourth lower surface configured to be oriented towards the upper surface of said ski and a fourth upper surface, opposite to said fourth lower surface and coupleable with the actuation surface of said operation lever, said third blocking means comprising fourth blocking teeth at said fourth lower surface, said fourth blocking teeth being oriented towards the upper surface of said ski and being positioned transversally with respect to said ski, when said ski binding is arranged on said ski.

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